

THE ATHENÆUM

Journal of English and Foreign Literature, Science, and the Fine Arts.

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LONDON, SATURDAY, AUGUST 23, 1856.

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METROPOLITAN
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H.R.H. the Prince of Wales has granted two Exhibitions, and others have also.

For prospectus and information apply at the Museum of Practical Chemistry, Jermyn-street, London.

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GUY'S, 1856-7.—THE MEDICAL SESSION COMMENCES on the 1st of OCTOBER.

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Guy's Hospital, August, 1856.

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Gosse's Handbook to the Marine Aquarium, 2nd edit. p. 21.

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XUM

LONDON, SATURDAY, AUGUST 23, 1856.

REVIEWS

The Wonderful Acts and Deeds of the City of Geneva, newly converted to the Gospel, performed at the Period of the Reformation; and how they were received. Written in the Form of Chronicles, Annals, or Histories, commencing with the Year 1532—[Les Actes et Gestes Merveilleux de la Cité de Genève, &c.]
By Anthoine Fromment. Brought to light by Gustave Revilliod. Geneva.

THE name of Anthony Fromment is less known in England than that of many other Reformers known and esteemed on the hill-sides and in the valleys of Switzerland. He was a gentleman of Dauphiny, who at an early age brought his learning and his zeal for the Reformation into Switzerland,—where he probably thought he could employ the first for the furtherance of the last, with less personal peril than in France.

What he did, and more of what he saw, in the country of his adoption during a few eventful years, he has set down in a chronicle, portions of which have before seen the light, but which has never hitherto been published in its fullness. The good author disappears in the course of the chronicle, and not much is known of what subsequently became of him. He made way for greater men; but he is supposed to have continued for some time preaching the Gospel, in an itinerant but not an inefficient, fashion. In 1548, he was the secretary of Bonnivard, at two crowns a month; and the chronicle now printed was written by the Secretary, but was probably the joint work of the able amanuensis and his accomplished patron. The personal experience of the first must have been invaluable to his colleague in the work, but the chronicle itself is commonly spoken of as the chronicle of Fromment. When it was written, the authorities of Geneva forbade, perhaps wisely, its publication. There are *hard words*, and, we may add, *unclean words* in it, for religious rancour (if such a term be justifiable) was raging in the breasts of adverse parties. Detached portions were, nevertheless, printed despite the authorities, and what was read gave appetite for what was held back. The writer, who had occupied so distinguished a place at the period of the introduction of the Reformed doctrines into Geneva, subsequently withdrew from his ecclesiastical vocation, and exercised the calling of a notary. The period of his decease is not known; and no limner has made his features familiar to the eye as his name, in Switzerland, is to the ear.

The analysis we proceed to give of this volume will afford, perhaps, the most suitable idea of the subjects of which it treats. It is fragmentary, diffuse, and irregular,—but it is graphic in all its details, and is most especially so when treating of street scenes. Nothing can be more satisfactory than these, except the masterly illustrations by which they are accompanied.—And now to the Chronicle.

In the year 1532 the reformers Farel and Sonnier, on a missionary tour, took up their quarters at an inn in Geneva, where they commenced preaching the Gospel and discussing Scriptural doctrines. The council and clergy of the city viewed this audacious attempt with indignation, disgust, and alarm. The ladies went further: they saluted the Reformers, as they passed along the streets, with “dogs” and “devils,” and other uncourteous appellations. The new teachers pledged their lives for the truth of what they taught; and council and clergy invited them to a disputation, under promise of safe conduct. Their arguments, how-

ever, were so unpleasant, that by way of refuting them the old orthodox party proposed to fling Farel into the Rhone. A servant of the Grand Vicar fired at him, but missed his mark. The mob, and particularly the women, showered rough treatment upon them, and finally they were swept out of the town, hurried across the lake, finding neither refuge nor safety till they reached Orbe,—where they told their tale to Fromment, and inspired him with a desire to take up the mission at Geneva, in which they had failed.

In November of the same year a placard, posted about the streets of Geneva, announced that there was “a man” at the Golden Cross, who taught French in a month and cured “many diseases” *gratis*. Men, women, and children were invited to attend; no payment was required unless success was acknowledged; and, in a short time, all Geneva was talking of the lad (he was only in his twenty-second year), who was teaching something more than French, and probing other wounds besides those of the body. People of all conditions and characters resorted to him. Some thought him an angel, others took him for a wizard. The women began to yield to the force of his lectures, and a good many called him dog of a Lutheran, and wished him at the bottom of the Rhone.

If the dangers of the position of Fromment and the unquestionable talent opposed to him be considered, his success was akin to miraculous. On the New Year's Day of 1533, such multitudes thronged to hear him, that he was carried out to the Market Place, and hoisted on to a fish-dealer's stall, whence he delivered a sermon on false prophets, which was eagerly listened to by his hearers, and from which the city authorities in vain endeavoured to make him desist. Before it was concluded, however, the approach of a band of armed priests and their followers induced the friends of Fromment to carry him off. He lay hid for some time, for his life was in peril. It was at length known that he was in the house of one Perrin, who received orders to eject the intruder. But stout Perrin maintained his right, as a free citizen, to keep whom he would for a servant, and the preacher was employed in making ribbons! There was a talk of firing his asylum, whereupon he took up his residence with an apothecary, Lanet. Subsequently the mob-clients of the priests and council attacked Lanet; they pelted his customers, flung mud into his shop, mixed his drugs together, and made a confluence of his draughts. In short, Geneva was made too hot for Fromment, who, like Farel, was compelled to depart.

But an impulse had been given that could not be checked. It was in vain that furious women threatened to fling those over the bridge who would not salute the host on its passage. The most able Romanist preachers heard their doctrines publicly questioned at the end of their sermons. Numbers increased on the one side, and exasperation on the other. Blows were exchanged, even between men and women. Impatient logicians fingered their daggers, sometimes drew them, and strengthened their argument by a stab under an adversary's ribs. The old church party at length resolved to make an end of a troublesome controversy by massacring their antagonists. From six to seven hundred priests and monks appeared in arms, and summoned the faithful to join them. The Reformers girded up their loins and descended into the streets also, heavily armed and resolute of heart.

“Of a surety one cannot describe the cries, sobs, groans and misery that abounded in the city, at seeing and hearing such things. For the son beheld his father

armed against him; the brother his brother; and neighbour was ready to smite down neighbour. The tears and groans of mothers, wives, daughters and little children in the houses, I leave you to imagine what they were.” The two parties were ready to open artillery and fly at each other, when some dealers from Fribourg, who had come to the fair, insisted upon acting as mediators, and forced a treaty upon the beligerents, the terms of which, says our honest chronicler, were violated by both parties.

Peace never reigned again between these fierce adversaries, till one side was finally subdued. Men met, not in friendship but in hatred. A Fribourg canon was killed in a quarrel, and a Genevese waggoner was tortured and executed as the murderer, to appease the Fribourgers,—who would not be appeased. Thus spread the fray, and the dissension which commenced with words between man and man, had now become sanguinary war between canton and canton;—and all for the honour of the Gospel of Peace!

Then arose the great Doctor Furbity, who was especially engaged to preach down Lutheranism, and whose style was so pleasant and illustrative, that the Genevese had no greater delight than in listening to the funny and familiar logic by which he sought to prop up the cause of his employers. He had, one night, delivered one of his most concisely vituperative sermons, when from among the dense congregation stood forth a man who boldly denounced all that had been uttered, and who calmly proceeded to prove the justice of his own denunciation. The man was Fromment, who had come back into the city, with Canus, who afterwards suffered death at Lyons. The tumult which ensued was terrific; again were there flights and concealments, and sudden appearances in public places, where the “chimney preacher,” as each reforming minister was called, preached heartily, while his hearers held their hands on their daggers, and covered his retreat when the armed and orthodox force of the authorities came to seize him. Occasionally there were seasons of respite. The reforming authorities of Berne were even powerful enough to procure the imprisonment of Doctor Furbity, on the grounds, not so much that he had offended God as that he had offended the burghers of Berne. Fromment and various fellow-labourers took advantage of such seasons of truce to preach in the private houses of the citizens or outside the gates of Geneva, when it was too dangerous to assert the truth in the public places within the walls. The zealous missionaries, meanwhile, dwelt in a well-frequented inn, the Moor's Head, which possessed a Romanist host and hostess. These detested their reforming guests, fleeced them in their bills, and belied them to the general company at the *table-d'hôte*. The landlady went so far as to say, that she had seen the new minister feeding a devil in his room, in the guise of a black cat; and the gossips added that Farel had no white in his eyes, and that from every hair of his beard hung a demon! “Ah, well!”—so ran the popular phrase, “Farel will sow, and Viret will grow, and Fromment will grind; but God will help us, and the devil will have them,”—and with this complacent assurance orthodoxy crossed itself, tossed off its beaker, and plunged into bed.

When the Episcopal party could neither catch, convert, nor suborn their adversaries, they tried to poison them. Then followed war, the intervention of the Duke of Savoy, treason and hard fighting. The success of the Reformers is sufficiently indicated by the fact that we find them amid groups of gunners on the walls, discussing doctrinal subjects, expounding texts,

and answering objections. Not only was military rudeness changed into gallant refinement, but many priests themselves, seeing that Reform was likely to be triumphant in Geneva, took to marrying the nuns liberated from their cloisters, or the buxom housekeepers of their own establishments. Fromment asserts that these last-named ladies affected to think that to be the housekeeper of a priest was less sinful than to be his wife; since the Church enjoined on such holy men a condition of celibacy. But the reforming leaders, who were acquiring power, facetiously, but justly, remarked, that the sentiments of these ladies reminded them of the confession of the fox, who devoutly accused himself of having swept the dew off the grass with his brush, but who did not mention that he was, at the time, on his way to rob a hen-roost.

We wish it could be said that when the reformers had overcome the enemies who had taken up arms against them, and were themselves in the ascendant, publishing freedom of discussion by public herald and sound of trumpet, they were more tolerant than their subdued adversaries had been in the days of their power. Such, however, does not seem to have been the case. In the summer of 1535, after a sermon by Farel in the Cathedral, the churches of the professors of the ancient faith were attacked by a mob of boys, and fierce men finished what had been commenced by wanton lads. The ruin of the Romish-decorated churches was complete; but the bitter memory of stupendous cruelty and oppression nerved the arms of the despoilers. In one church were found fifty consecrated wafers; and these the Magnifico Miret flung to his dog, saying, "If the wafers be gods they will not let themselves be eaten." The dog, however, swallowed them,—and thus all the blank gods and idols of the priests in Geneva were broken or devoured by Miret's spaniel." Even costly pictures—the miracles of Art—were ruthlessly destroyed. If a reformer who loved painting and painters advanced his arm to stay the uplifted knife, or sword, in the hand of a blindly-furious Calvinist, the latter cited a text as his justification, and then with his weapon ripped up the canvas.

The refectories were occasionally as rich in pictures as the chapels; but the subjects scandalized the new authorities, who destroyed in secret the comic illustrations of monastic life, and did not exhibit them to the people generally, as they did the renowned arm of St. Anthony (which proved to be something very different from what it was called) and the means of performing miracles,—some of which were ingenuous, and others very nasty.

If intolerance was met by intolerance, we may perhaps find the reason for it in the circumstances of the time. In 1534, Farel had foiled Furbity in discussion before the Genevese Council. This was the turning point of the Reformation, and thenceforward its triumph in Geneva was secured. The Genevese Senate was some time in coming to a decision between the antagonists. That august body saw the Reformers in the city supported by the canton of Berne, and opposed by that of Fribourg. The cantons were in league, but, finally, the Genevese Senate took heart of grace, opposed their own bishop, and allowed Farel to preach in one church in the city. It was not long before the great reformer succeeded in obtaining permission to preach where he would. The Romish Bishop had fled—his see was, by the Senate, declared vacant—the greater part of the citizens joined the Reformed Church—the performance of mass was prohibited by law—and the authority of the Papacy was set aside. The enslaved then

became wild in their freedom, but their rulers were sufficiently calm to look to the security of their political interests. Syndics were appointed—the city was fortified—and every means was taken to defend what had been won. In 1536, the Duke of Savoy blockaded the city—subjected the citizens to fearful sufferings by famine—but failed to quell their proud and determined spirits. The stout-hearted people even declined the aid of France. It was a very suspicious aid, indeed, which was offered, and they were right in declaring that they preferred to depend on the succour of God alone. They, however, willingly accepted help from Berne and Neuchâtel, and their success was complete and permanent. Farel was, undoubtedly, intolerant, but he and the people were exasperated by persecution. Still greater was the provocation of Bonnivard,—but that illustrious man has made his glory more lasting by his unceasing protest against anathematizing the Romanists, and by his unvarying advocacy of toleration.

That much bitterness of spirit reigned is certainly not a matter for especial wonder. Fromment writes in strain of gall, and if we had no guide but his Chronicle, we might believe that *all* the iniquity was on the side of the Romanist party. The details which he gives would offend our readers were we to reproduce them, but they are of great importance to the historian, by way of evidence, as far as they go. The immortal truth, nevertheless, is not to be sacrificed for the sake of any party. Paul Henry, in his great work, the 'Life and Times of Calvin,' acknowledges that at this period the reformation in Geneva was only "outward"; and Bonnivard himself thus speaks to the Reformers:—"How can you reform the Church who are yourselves so unreformed? You say the monks and priests are gamblers, unchaste, drunkards; but you are the same. You wish to expel the Popish clergy, and to put preachers of the Gospel in their place. That in itself will be good; but it will be bad for you, who put all your comfort in hidden pleasures. The preachers will establish a reformation which will subject vice to a merited punishment. You have hated the priests, who are too much like yourselves; you will hate the preachers, because they are not like you. Not two years will have passed away before you will wish they were priests, and you will pay them their wages with a heavy cudgelling; men are willing enough that justice should be exercised against others, but not against themselves. Love for freedom," concludes Bonnivard, "has degenerated into the love for licentiousness. Most people imagine that the Reformation consists altogether in doing away with masses, monasteries, and saints' days." It is due, however, to the Reformers to confess, that even before Calvin appeared in Geneva strong discipline was laid upon man, which may not, indeed, have converted him,—which may, occasionally, have made of him a hypocrite,—but which rendered some virtuous through dread of the penalties laid upon vice, and which made the vicious more mindful than before to respect society by an observance of decency. The civil despotism which was established at Geneva was more oppressive than any tyranny by which that or any other city had ever before suffered; but if it was so rigid that the husband was fined who dared kiss his wife on a Sunday, it had this consequence, that a maiden might walk abroad without insult, and that her property was as safe from outrage as her honour. Not that such a condition of things was peculiar to Geneva or her reformed magistrates. When Brien ruled in Ireland, a woman might walk the length and breadth of the land without fear for the gems she wore or the virtue which adorned her. Not, says the ballad,—

That Erin's sons were so good or so cold
As not to be tempted by women or gold,
but that they loved honour and virtue more
than beauty and jewels. Geneva, it is true,
may reply to this,—the condition of Erin, as
here described, is only legendary, but that of
Geneva is a matter of history that cannot be
confuted.

The account in the latter half of this book touching what was effected by this people is sufficient to show, however, that the reforming authorities had very rough materials to deal with; also that they not only knew how to mould them to the good purposes required, but that, stubborn and offending as the rude men were, they were sufficiently enlightened to their interests, present and future, to lend themselves readily to the objects of those who scourged them for their profit. It is impossible to read the record of the struggle in these pages without rejoicing that the victory remained with Geneva; and if we do not accept all that was done by the administration after the victory was secured, we cannot deny that the system adopted was the one which the exigency of the times imperatively required. The whole reads well in the simple, old-fashioned French in which it is written. The author puts down nothing that he did not see, or did not hear on good testimony. He is very unobtrusive, and tells his story in a picturesque way. But the true picturesqueness of the book lies in the numerous etchings by which it is profusely adorned and the letter-press illustrated. To those to whom the letter-press may not be easily comprehensible, these admirable works of Art will be at once intelligible. They reveal contemporary life in Geneva,—the habits, manners, customs, characters, and passions of the period. They combine the powers of Callot and Rembrandt in their groups,—now of mingled comic and solemn illustration, now of light and shade and mystery. The volume itself conveys the pen-and-ink sketches of what took place in Geneva before Calvin came to take in hand the helm, steady the much-shaken vessel, and carry her safely into port;—but these "pictures," and they are finished enough to deserve the name, form a series of moving scenes which, with respect to the career of Calvin in Geneva, are as a brilliant pictorial prologue to a drama wherein one principal personage for ever keeps the stage, around whom crowds move, more or less excited, and to whom is given to reap the triumph which was often most imperilled by himself.

Bothwell: a Poem. In Six Parts. By W. Edmondstone Aytoun, D.C.L. Author of 'Lays of the Scottish Cavaliers.' Blackwood & Sons.

WHEN some one—we think Moore—asked Scott why he wrote no more poems, "Because Byron *bet* (beat) me," was the answer. Prof. Aytoun has forgotten the story and its moral. The world, however, will remind him that he cannot beat Byron, who beat Scott. His 'Bothwell' will not add to a reputation deservedly won as a writer of ballad-romances. In smaller flights he has shown himself gay and vigorous, and we have said so. In this new flight his wing seems weak compared with the wing of the northern eagle; and, moreover, the way sunward seems not to have been clear to the singer.

Like Crabbe's 'Sir Eustace Grey' or the Laureate's 'Locksley Hall,' 'Bothwell' is a monologue, supposed to be vented by the personage who lends it name, during his confinement in the fortress of Malmoe. The key in which it is written, adds Prof. Aytoun, was suggested by the descriptions given of Bothwell by Throckmorton and Herries. Naturally enough such a man's retrospect must comprise

narrative; but would the narrative of a Bothwell have been the meandering, diffuse tale set before us, decked out with similes, and not clear of such morals as delight an audience in Clapham or Hackney? Allowing the utmost licence to poet, we cannot fancy anything of the kind. Here we have nothing bold, fierce, or fragmentary. The lay of the imprisoned conspirator is clerky, tedious, and complete.—Bothwell cants rather than curses,—explains and soliloquizes his sentimentalities in rhyme instead of expressing them in his sensualities, as heroes like himself are apt to do; and passing them over afterwards as so many matters of course. He had, as we read him in history, brute force, brute fascination potent enough to overawe the will and grasp the heart of such a mere woman as Mary Queen of Scots; but to set him going as a rhyming penitent in a confessional seems to us one of those mistakes in conception which decides the character of a poet. Rizzio might have been allowed to play the song of his love, his jealousies, his tragic forebodings to his harp; but to put connected speech (even on the argument of raving) into the mouth of such a freebooter as Prof. Aytoun's hero, is an absurd mistake. Scott knew better. He set his rude people in a right framework, and his minstrels in their due place, hall or bower, where minstrel singing could enchant those waiting for pleasure. To make Bothwell his own minstrel cannot be right; and we are sorry, for the reputation of a clever man, that it has been attempted.

We have no fear that any lover of Scottish romance and of Scottish minstrelsy on this side of the border will consider us partial in our remarks. Open the monologue wherever we will, lengths such as the following lengthen as we go.—

Men say that in those northern seas,
Far out from human view,
There lies a huge and whirling pit,
As deep as though the globe were split,
To let the waters through;
All round and round for many a mile
Spreads the strong tide's resistless coil;
And if a ship should chance to pass
Within the Maestrom's sweep,
Nor helm nor sail will then avail
To drive her through the deep.
Headlong she rolls on racing waves,
Still narrowing in her round,
Still drawn towards the awful brim
Of that abyss profound.
Then one sharp whirl, one giant surge,
A lurch, a plunge, a yell,—
And down for ever goes the ship
Into the raging hell!
God wot, I am not fanciful;
But from that fatal day,
When first I leagued with other men,
And left my open way,
No power had I to check my course,
No will to pause or stay.
They knew that I was proud and bold,
And foremost still would go,
Where danger waited in the path,
Nor even count the foe.
And they had read my secret heart,
And set their cunning snare;
O, had my only thought been love,
They'd not have bound me there!
But there was hatred in my soul;
And more, that glorious sin,
Ambition, cursed by all who lose,
No crime for those who win.
What sceptre ever yet was gained
Without the reddened hand?
Light penance serves to cleanse the stain
From those who rule a land.
Hero, and king, and conqueror—
So ring the changes here,
For those who rise by any art,
No matter what they were!
Wretch, villain, traitor, regicide—
These are the counter-names
For men whom fortune sets aside,
However bold their aims.
I would not care for vulgar speech;
But, O, it drives me wild
To know that cold and reckoning knaves
Have swayed me like a child.
Tell me no more of guilt and shame!
'Tis worse to be a fool,
To play the subtler traitors' game,
Their partner and their tool!
'Twas in Craigmillar's ancient pile
That first I lent my ear

To the dark words of Lethington,
With Murray bending near.
The theme was Darnley and his deeds,
His vain capricious mind,
That no controlling power could guide
Or sense of honour bind;
His wild outrageous insolence
To men of high degree,
Who, but for Mary's love and grace,
Were higher far than he.
All this I heard, and answered not;
But when he came to speak
Of Mary's wrongs and Mary's woes,
The blood was in my cheek.
He told me of her breaking heart,
Of bitter tears she shed,
Of the sad cry she raised to heaven,
"O, God! that I were dead!"—
Of that dull grief which, more than pain,
Has power to waste and kill;
Yet in her secret heart, he said,
Queen Mary loved him still.
"Loves him?" "Why, ay! Our thought was bent,
At first, on Darnley's banishment;
On loosing of the nuptial tie,
As holy church allows—
An easy thing, for never yet
Was such a faithless spouse—
But when we broke it to the Queen,
She would not deign to hear;
He was the father of her child,
And so to her was dear.

In this language we fail to find either a character, a country, or a period. The direct utterance "for all time" which makes every Biblical record so full of picture, is not here; nor is the costume of the Scottish nobleman; nor the character whose description by Throckmorton as being "rash and hazardous," is quoted by our author in his preface.

Tracings of Iceland and the Faroe Islands. By Robert Chambers. Chambers.

THE Danish war-steamer, the Thor, touched at Leith last summer, having on board the Governor of Iceland. She was permitted by the Government at Copenhagen to carry six gentlemen as passengers, at a moderate charge. Mr. Chambers is one of those who availed themselves of this opportunity; and we are very glad that he did so, as he has given us a very interesting account of regions of which we know but little. We can now safely recommend the Faroe Islands to the notice of tourists of a certain class. The gentlemen who at present *yawn* along the Rhine or through Switzerland might *stare* here. Even Sir Charles Coldstream, who shook his head over the crater of Vesuvius, with the desponding remark, "There is nothing in it," might find a sensation in the Faroe Isles. To be told when you inquire for the sights of the place that you *must* visit "Paul Jonson's huss," and then discover that the beauty and novelty of this dwelling consist in the fact that it exceeds one story in height,—to be where a clergyman seldom and a doctor never comes,—and where the single family that forms the population of one of the islands, having let out its fire, is said to have remained the rest of the winter without fire or light. These things would be a complete change from the lands of palaces, cathedrals, hospitals, and lucifer-matches. Yet the approach to Thorshavn was disappointing.—

"It was a surprise to all, that no salute passed between the ship and the fort; but we afterwards learned, that it was as well for the fort that no such ceremony was called for, as to tell the truth, its four guns are now so crazy in the mountings, that they could scarcely bear being fired. What marked our mercy the more was, that a French corvette came not long ago to Thorshavn, and gave a salute of twenty-one guns—a superfluity of politeness for which it got anything but thanks, as the fort had to answer gun for gun, and the commandant hardly expected to see himself left with a single mounted piece. Such is the happily secure condition of Faroe—expressive instance of the peace which resides with poverty! For anything that I could learn, there is not a dozen soldiers in all this group of islands. Their military stores are on a similarly narrow and simple scale. It is related that when the Prince of Denmark came

to Thorshavn Bay some years ago, the fort began to fire a royal salute, but stopped short in the middle. The captain of the prince's vessel sent to inquire the cause, and learned that their stock of gunpowder was exhausted. He sent a supply, and the salute was completed."

—We call this disappointing, not from any love of noise and gunpowder, but because the traveller would expect to find everything novel in these remote regions, and the above description might be applied unaltered to most of the batteries, towers, gun-hills, &c. that pass for coast defences at home. But it is not to the worn-out tourist alone that these islands are interesting. The following general description may indicate their value to the geologist:—

"It may be well here to intimate, once and for all, the general fact that the Faroe Islands are merely a set of mountains, of a lengthy form, lying in a north-west and south-east direction, with narrow sounds between, nearly all of them being composed of slightly sloping beds of trap, alternating with tufts and clay-stones, and all swept bare. It becomes evident, at a moment's inspection, that they have all been one continuous sheet of such beds at one time, and out of which interspaces have been cut in a determinate direction by some externally applied force, for the beds on opposite sides of valleys and sounds exactly tally with each other. One mountain or island being higher than another, or having any part of itself higher than the rest, is merely owing to this external force having been there more resisted, and consequently having taken less away. As additional features depending on those now described, I may remark the terrace-like arrangements everywhere conspicuous along the sides of the islands. One of these terraces is merely a trap-bed standing out in a certain degree of prominence, in consequence of the above externally applied force having been able to cut comparatively deep into the softer tuftaceous strata between."

The Thor was the first steamer that ever visited Iceland, and its appearance excited some terror among the simple inhabitants. The Governor, who enjoys a salary of something less than 400*l.*, having landed first, the passengers followed, but found Reikiavik and its inhabitants far less rude than they had hoped and expected. The fact is, that it is a Danish rather than an Icelandic town, the inhabitants being for the most part merchants and public officials. There is a public library and a public school,—the salmon fishing is leased;—and the inhabitants dance the polka, the ladies asking the gentlemen as often as the gentlemen the ladies. Turning from this dull scene of civilization, Mr. Chambers and the other passengers, together with the captain and three of the officers of the ship, proceeded to visit the celebrated Geysers, which are situated about 70 miles from Reikiavik;—as there are no roads and no inns, the journey must of course be performed on horseback, and you must take your provisions, tent and bedding with you. The author is not given to horsemanship, and had serious thoughts of obtaining a sort of chair side-saddle which is used by the Iceland women, but he had not the moral courage to do this,—so "gave up all idea of heterocrite riding, determined to do as the rest did, and bitterly thought of the morrow."

After a hard ride of 30 miles, the incidents of which are amusingly narrated, they arrived at Thingvalla, and, according to the custom of the country, were allowed to take up their quarters in the church, which is 25 feet long by 10 feet 3 inches broad. Nine feet of this structure, at the east end, are set apart as the chancel, and in this portion the author and five of his companions slept. The priest, a kind and hospitable man, did all he could for them, and the oldest of the party slept in his only spare bed. A corrupt Latin was the only language in which he could communicate with the

author. He had a wife and eight children, a preaching station eighteen miles distant, and an income of 25*l.* a year English money. " *Decimis inclusis?*" I asked. " *In toto,*" replied he. " *Habesne agellos aut fundum?*" " *Non.*" " *Habes equum?*" " *Imo, bonum equum.*"

Another day of laborious travel brought them to the field of the Geysers,—and, having made their coffee from the hot water of the great basin, they were accommodated for the night in a small farm-house, where, as they slept, they "bore considerable resemblance to a box of sardines; and if any one had been disposed to turn, a general movement of the party somewhat like that of a Venetian blind would have been necessary."

The next morning the author saw an eruption of the Great Geyser, which he thus describes:—

"The prominent object before me—the *ground* of the spectacle, as an artist might call it—was the vast effusion of steam covering the place, and rolling away under a varying wind. It was only on coming pretty near, and getting to windward, that I caught the sight of a multitude of jets of water darting in outward curves, as from a centre, through amidst this steam-cloud, glittering in the sunshine for a moment, and then falling in heavy plash all over the incrustated mount. It seemed to me—that the circumstances are certainly not favourable for an accurate estimate—that these jets rose about sixty or seventy feet above the basin. Three or four of our party looked on excitedly from a little distance beyond the reach of the water, but half-concealed amidst the steam. It went on jetting thus at brief intervals for a few minutes, and then gradually ceased. When I could venture up to the brim of the basin, I found the water sunk down a few feet in the funnel; so I was able to descend into that beautiful chased and flowery chalice, and break off a few specimens of its inner lining, now partially dry by reason of the heat communicated from below. The rest of the farm-house party came one after another upon the ground, to express their vexation at so narrowly missing this fine spectacle, as well as that of the preceding evening."

The author does not suggest any theory of his own as to the causes of these outbursts, which occur about once in twenty-four hours, but states those of Sir George Mackenzie and Prof. Bunsen.

The Thor being under orders to return on a certain day, no other expedition was possible, and the author returned to Leith, highly delighted with the Danish captain and his officers. The author's descriptions of what he saw are carefully and clearly written. While his eyes are principally directed towards the earth itself, his geological observations being recorded with great minuteness, he by no means overlooks those who dwell upon it. From him we learn that Denmark has recently established free trade in Iceland;—that the Athling, or supreme court of the Icelanders, at present thwarts the home government in every possible manner,—and that all improvement in the island is prevented by the intense love of the people for the country as it is. They regard all inconveniences and faults which are social and characteristic with affection. The vigorous steps which the home government took in 1848 appear, however, to have effectually secured the peace of Iceland. An army consisting of a lieutenant and thirty-six men quelled the rioters and carried away their four small guns, thus disarming the island.

The principal if not the sole work of Art of importance is a font by Thorwaldsen, presented by him to Iceland, as the land of his ancestors, his father having been a native of the island. The cultivation of literature is known to be far more extensive than might be expected with so rude a people, and the fact is fully borne out by the statements of Mr. Chambers.

We have seldom perused a more pleasant

little book than the present. It is full of information, imparted in the most agreeable manner.

The Camp and the Cutter; or, a Cruise to the Crimea. By Edwin Galt. Hodgson.

Mr. GALT being the fortunate possessor of a cutter yacht of 6*t.* tons, resolved last autumn, in October, to go and see our "gallant fellows" in the Crimea. With a prudence not uncommon in the yachting fraternity, he shrank from the Bay of Biscay—ran across to Malta by rail and steam—and left the cutter to go round by sea. An account of his journey before and after he joined her, and what he saw in camp, makes up the little book before us.

Assuredly nothing can well be lighter, frothier or emptier, than Mr. Galt's Cruise,—not that we use these terms to disparage a gentleman who dishes up his letters for the benefit of the public, and asks us to share his reminiscences. But the truth must be told. A man who publishes invites remark,—and our traveller must learn that nearly every one will think him flippant, while only a few will plead that he is smart. He has modelled his style on that of the small comic school on which we occasionally have to remark,—and as this school spoils several young fellows of some promise, we shall illustrate what we mean by specimen. Here is Mr. Galt describing a well-known Eastern scene:—

"The varied uniforms and accoutrements of the men around this huge marble fountain, together with the splendid mosques of Scutari, whose domes and minarets rise up close by, while on the opposite side is the noble range of hospital buildings, presented a perfect picture of eastern magnificence and splendour. During the movements of the cavalry, I heard some frightful singing and yelling over my head; I looked into the air, naturally thinking that some large birds were passing over. The noisy monotonous chant still continued; and at length I espied, high up in the balcony of a minaret, a white-turbaned old Muezzin Turk, 200 feet above us, shouting and gesticulating to all four points of the compass, and calling all true believers to attend the mosque. This performance takes place five times every day. Supposing an old gold-laced sexton, in London, ascended five times a day to the top of St. Paul's, vainly trying to make himself heard either at Notting Hill or Putney, would it not be the height of absurdity? The men of the 6th Dragoon Guards were convulsed with laughter; and, instead of looking, as all soldiers should look, straight before them, every back was turned, and every head strained, to get a glimpse of the individual on the top of the mosque. The men soon took up the burden of the verse from the Koran, that the Muezzin was chanting; and when they commenced humming 'La Allah, Allah, Mohammed,' or something similar to that, their officers could not refrain from joining in the laughter."

In the same dreary and irreverent spirit the writer describes a clergyman whom he meets in a steamer as "a perfect model of powder-and-shot piety,"—and pronounces Turkey hopelessly exhausted on the strength of some ten days' acquaintance with it. We are not surprised to find Mr. Galt describing the Maltese as "a caste of Italians" (the fact being, that that curious race is of Eastern origin);—and breaking into the historical reflection on entering the Gulf of Athens, that "on this spot had Plato delivered his famous addresses to his pupils,"—Mr. Galt evidently thinking that the 'Phaedrus' and the 'Phaedo' were delivered to a body of Greek schoolboys in the way of addresses at the end of "the half!"

The Camp is a scene with which a hundred pens have made us familiar; but we willingly testify that among the huts and the snow the traveller's style improves. He arrived after the siege and the fighting was over; but ate his

Christmas dinner in a hut on the heights, with men who had seen both. He thus picked up some material which may aid people in realizing the features of that memorable scene. But a story illustrating the "routine" of which we have heard so many complaints, is perhaps better worth quoting than descriptions of what has often been described. It is the story of a pair of fur gloves.—

"They had cost the sum of two shillings and eleven pence, and had been the innocent cause of more waste of official paper than possibly the merchant had expended in the transaction of purchasing ten thousand pounds' worth of them; for be it known, in the first place, that the piercing north-east winds sweep down this valley in such keen and biting blasts that, to prevent frost-bites, it becomes necessary for officers and men to fortify themselves with these warm gloves. One pair was demanded by an officer; the requisition was duly drawn up and signed according to the necessary form, and then this requisition commenced its somewhat long and erratic journey. The order for the gloves of the value of two shillings and eleven pence was first forwarded to the *regimental quartermaster*; it was then sent to the *colonel of the regiment*, for his endorsement, from him it went to the *brigade-major* who transmitted it to the *assistant quartermaster general*, and thence it reached the *quartermaster-general*, at head-quarters. From him the order came back to the *quartermaster-general of division*, then through the *brigade-major* to the *colonel of the regiment*, who directed the *quartermaster of the regiment* to send it to the *quartermaster-general* at Balaklava, when the gloves were issued, and at length they came back to the *officer who made the application*! the order having thus travelled the distance of thirty miles and four-fifths, all for the value of two shillings and eleven pence."

Altogether,—if far from the best—Mr. Galt's is not the worst specimen of the light literature of the war.

Natural History of the Animal Kingdom. By W. S. Dallas. Orr & Co.

THIS work is a reprint of the Zoological portion of the 'Circle of the Sciences,' produced by the same publishers. Every naturalist is aware of the capability of Mr. Dallas to compile and arrange such a work, and it could not have been placed in better hands. It is not too much to say that it is at present the best "systematic and popular description of the habits, structure, and classification of animals" in our language. Mr. Dallas has availed himself of every means of information, and has drawn his examples, as far as was practicable, from the natural objects of our own country,—a plan which is at all times desirable, provided such examples are as instructive as those to be obtained from foreign sources. When, however, we say that this is the best popular book of the kind which we at present possess, we do not mean that it is all that is wanted,—far, very far, from it; for in the whole circle of science there is not a greater desideratum than a good, plain, intelligible, and at the same time thoroughly scientific, introductory work on Zoology. Such a work could not, we believe, be produced by any one person living. It must be the production of several; and those men of high attainments in the different departments of the science. Why should not this be done? We could point out half-a-dozen men who could,—we will not say easily, but most effectually—carry out such a scheme; and its utility would be beyond price or calculation. How often have we been asked to recommend the best general introductory work on Zoological science, and have had to reply that we possess no thoroughly good one in this country. It would be a great benefit to the young students of this branch of knowledge if these hints should lead our best naturalists to combine in such an

diminutive Laps, dressed in their summer suit, a dingy flannel blouse, ornamented with edgings, and shoulder-straps of red and yellow. From their leather belts depended large knives. Fin-women, too, were not wanting, conspicuous by their caps, like truncated cones, adorned with gold and silver lace and bright-coloured ribbands. These tiny people contrasted strangely with the bulkier Norwegians. Here were the blue eyes and fair hair of the descendants of the Vikings, with countenances solemn and sedate. There the gleaming, deep-set orbs, high-cheeked bones, elf-locks, and scanty beards of the inferior race. Some of these intently watched the service with a look of mingled curiosity and fanaticism; while others stared around so wildly and fiercely, that one might fancy they would draw their long knives, and set up a wild war-whoop. Most of these Laps or Fins (they are called by both names) were still nomads, living upon the fjeld summer and winter; 'Fjeld Finner.' Their encampments were on the adjoining mountain. Others were Sea-Fins, who, giving up a wandering life, have settled down by the Fjords, and taken to fishing, and cultivating patches of bog or rock. These last are inferior to the former in appearance, and are generally poorer and worse off. In fact, they seldom thrive away from the mountains. The instinct of roaming is so strong upon them, that after trying a settled life for a time, they suddenly pack up what they can carry, and join their brethren on the fjeld. I have myself seen more than one dwelling, which it must have required much labour to build, entirely deserted. The number of Laps in Norway at the last census in 1847 was 14,464. It is not above a hundred years since they were nominally converted to Christianity. But it is only of late, principally owing to the exertions of Thomas von Westen and Stockfleth, who translated the Greek Testament into Lappish, that they have become acquainted with the practical doctrines of Christianity. While in the throes of recent conversion, their minds, naturally excitable, were worked up into a state of religious frenzy, which was productive of the worst consequences."

The sketch of a Danish Count whom the writer had for fellow-passenger in a steamer is very amusing, but too long for extract. His details of the coast fishing, which is so important a trade among the natives of the North, is interesting also, in a different way; and of course he does not neglect to tell us about the salmon,—which to many people will constitute the chief interest of the book. Indeed, it is his merit that he combines variety of information about Norway in his two volumes; and this is a merit which would give value to a book inferior in attractiveness of style.

The Marriages of Paris—[*Les Mariages, &c.*].

By Edmond About. Paris, Hachette & Co. The title of M. About's new venture in the world of fiction promises more "mischief" than the work itself performs. All that we English have seen, and all that we have read in French books treating of society concerning the manner in which marriages are contracted across the Channel, indicate how deep is the channel that sweeps betwixt Dover Cliff and Fort Rouge, Calais. Not only does the young British lady, on her preferment, widely differ in position and privilege from "*la demoiselle à marier*," but the manner in which *Miss Bull's* heart, or her hand at least, is given away bears little generic resemblance to the procedure used in that interesting transaction by our Allies.—"Cedar parlour" conferences, doubtless, there are still in England, as there were in the days when *Grandmamma Shirley*, *Uncle Selby*, *Lucy*, *Nancy*, *Kitty*, *Lady G*—, and others, sat in conclave to decide on the limits within which *Harriet Byron* should bind or loose her "*punticillo*" when she was at last courted by *Sir Charles Grandison*. We know of ill-assured bachelors—blushing beneath the snow of grey hairs, and made sensitive by the loss of figure attendant on a prolonged course

of bachelor conviviality—who have been too timid to go a-wooing without a fluent cousin or solid uncle in hand to speak for them, and to certify to the figures of their rent-rolls, by way of enticing and re-assuring the discreet fair ones solicited. These, however, are curiosities: whereas, in France, so far as we have been able to gather, the Go-between is the rule of the Ring, not the exception. There, a bearded man, six feet high and four round, will own, as a matter of course, to have been trafficked for by "*maman*,"—though that lady (as happened in the well-known case of the ever-green French actress) is—because she chooses to look—twenty years younger than her son! Our readers will not have forgotten Madame Dudevant's revelations of the manner in which, though a bold, original, and unworldly girl, such as she describes herself, she was yet disposed of, for better, for worse, by a host and hostess who had invited her into the country with the express purpose of settling her in life. Were we to continue our citations from national novels,—whether the author of them be Charles Bernard, or M. Dumas *filé*, or M. Paul de Kock, or Madame de Girardin,—we should not soon have done with the list of magic transformations from *Rake* into *Paterfamilias* effected by interfering *Wisdom*, *Virtue*, and *Foresight*. Something of the kind, though "with a difference," was felicitously shown us the other day by *De Florac*, in Mr. Thackeray's last novel. With all the cynicism of their manners and morals, there is mixed up in the character of the French a dash of trusting childishness, which neither time nor circumstance seems able to wear out of it.

But such worth, and grace, and peculiarity of subject as are indicated in the above remarks do not appear to have suggested themselves to M. About. He has here merely collected from past numbers of the *Moniteur Universel* half-a-dozen pleasing and warrantable love-stories (the adjective is no small praise as applied to modern French fiction), most of them terminating at the *mairie*, or under the scarf which the *garçons de noce* hold, canopy-wise, above the heads of bride and bridegroom. M. About "leans to virtue's side." In 'The Twins of the Hôtel Corneille,' he shows us how the beauty brother, by speculating on his beauty to make a way for him in the fashionable world, and by living on his capital for a twelvemonth, was deluded into marrying a German sharper's daughter;—while the good brother, who imagined that he was espousing garret-virtue in indigence, unexpectedly came in for a Californian prize, by the appearance of that long-lost relation supposed to be dead, but in reality enriched,—who turns up so often in novels, but how sadly seldom for the real solace of patience and chastity!—In 'Land to Sell,' we have a touch of artist-life;—in 'Gorgeon,' the consequences of a theatrical marriage, ending somewhat too tragically, after the fashion of the marriage of M. Augier's *Olympe*. 'The Mother of the Marchioness' shows how a provincial widow, who is as ambitious for fine company as Goldoni's *Mercantessa*, wastes her best days, and nearly loses her "all" of home, love, and credit, by her resolution to figure in Paris, and to make one of the society of the *faubourg*. Having married her daughter to a Marquis, she conceives her way short and smooth; but the Marquis is as averse to conventionalism as if Madame Dudevant were his mother, and poor Madame Benoit is compelled to be artificer of her own position. How her stratagems succeed is told with lightness, humour, and a certain under-current of wholesome heartiness not to be overlooked.—On the whole, this miscellany, which belongs to the

French Railway Library, may be commended without question or stint, as an amusing addition to the pleasures of the road-reader in France, and as worth being saved for binding after the fatiguing ceremonies of claiming luggage and passing the *octroi* on arrival at the station have been endured.

NEW NOVELS.

Eveleen. By E. L. A. Berwick. 3 vols. (Smith, Elder & Co.)—We closed 'Eveleen' with a feeling of gratitude that the world is peopled with men and women, not with heroes and heroines. If any Celebs in search of a Wife were to encounter Eveleen in flesh and blood, he might be forgiven if he retired to a monastery, or if he dug a cave and lived in misanthropy for the rest of his natural life, rather than run the risk of bridecake and lawful matrimony with a woman possessing and exercising such terrible powers of—eloquence. Eveleen is calculated to strike terror into the hearts of bachelors. Clorinda, Bradamaute, Zenobia, Xantippe were ordinary females compared with her. When scarcely out of the nursery she wields "the power of the keys," and governs her uncle's house and her uncle's children until she is deposed in a domestic revolution:—her uncle marries a second wife,—and the second wife "has a maid called Barbara,"—and both mistress and maid are as wicked and tyrannous as the wicked queens and stepmothers in old fairy tales; so it is well for the rest of the family that Eveleen is a heroine capable of fighting their battles and her own. Of course, the wicked stepmother hen-pecks her husband, ill uses the children, and especially persecutes Eveleen: but when did any good ever come from persecuting a heroine?—It infallibly brings utter ruin and confusion of face to all who are so ill-advised as to attempt it. The stepmother induces her husband to enter into speculations which do not answer; she insists upon his making a friendship with the villain of the book, Mr. O'Fea, who ruins him, and then she endeavours to force her stepdaughter into a marriage with him, founded on the old stage romance of sacrificing herself to save her father. Mr. Cabell O'Fea has run a long course of successful villainy, which is patent to all the world in the shape of ill looks and the worst possible reputation, but he has never been thwarted or circumvented until Eveleen, a heroine seventeen years of age, enters the lists against him. Of course he makes great resistance, and shows himself so powerful and unscrupulous that anybody else must have fallen a victim;—as it is, she goes through dangers and adventures sufficiently perilous even to *read* of, but at last she frustrates his designs and drives him ignominiously before her off the stage. After this she reappears for an instant, wearing the coronet of a model young nobleman with fifty thousand a year, whom in the course of the story she has lectured at odd moments upon his social duties, in a strain that would not have disgraced Mrs. Trimmer herself. As good advice is never thrown away except in real life, it has taken great hold upon him, and his heart is fairly broken by her long speeches. The sympathizing reader will be apt to tremble for the prospect that lies before him. With all its faults, however, 'Eveleen' is a work of promise; it bears evidences of care, pains-taking, and honest hard work,—qualities to which we always give honour: but as a work of fiction, intended to give amusement to the reader, it fails. The style is heavy and pretentious,—full of long words, and so many of them that the sentences fill the reader's mouth like so much chaff. Take the following as a specimen,—it is selected at random:—"Although these and such like thoughts paced through the chambers of my brain as I cogitated on the substance of the conversation which I had recently held with Mary, still I felt that I had neither plea nor pretence to interfere. I therefore resolved to wait and watch patiently, and to offer no opinion and take no step until my uncle and his friend returned from their journey and announced its issue. But most assuredly I determined that Mary Barrington should never be Mrs. Cabell O'Fea, if by any possible effort or sacrifice

on my own part I could avert such a calamity from my gentle favourite." One main drawback to the interest in this story is, that everything is made subservient to Eveleen herself. Stories written in the first person require as much care to tone down the egoism as would be required in real life. Eveleen is represented entirely destitute of any graceful humility: the effect consequently is that of a hard, self-sufficient, and extremely ill-bred young woman. The incidents of the story do not cohere well together, and there has apparently been some change of plan from the original idea. The wicked stepmother, who at first is represented as a species of Clytemnestra in social life, subsides into a commonplace worldly woman,—artful, certainly, but needing none of the superfluous baseness with which she had been invested. All her mischief is transacted by her maid Barbara, who seems to be quite a second thought. She does at once too much and too little, and goes out at last like the snuff of a candle. Miss Hetherington, the heiress, is introduced merely as a foil to Eveleen: she does nothing except to delay the story by quantity of talk that results in nothing. The character of the uncle is feeble and repulsive: he has shown neither conduct nor courage: he has been quite willing to sacrifice his daughter to his own convenience: his spirit of self-assertion at the end is felt to be quite out of keeping. The other characters are merely dramatic make-weights, such as any theatrical wardrobe would fit out at a moment's warning: they are conventional Irishmen, with nothing to distinguish them from all the Irishmen of that class who have appeared in the pages of any novel. The author may think our strictures severe; but we should scarcely have been at the pains to analyze the book in so much detail did we not conceive that she has the power both to correct her faults and to write a book which it would be a pleasure to read and to praise.

OUR LIBRARY TABLE.

Ben Sylvester's Word. By the Author of 'The Heir of Redclyffe,' &c. (Mozeley & Co.)—'Ben Sylvester's Word' is a story intended for children at Sunday schools, and is a good story of the kind. The advantage of telling the truth, in the face of the danger it seems likely to entail, is the moral proposed; and it is worked out in a spirit likely to inspire both the strength and the desire to be true in all who may chance to read it, whether gentle or simple. It is in the form of a small stitched book, and we can recommend it to such of our readers as wish for a cheap reward-book for children, young people or servants.

Personal Narrative, in Letters, principally from Turkey, in the Years 1830-3. By F. W. Newman. (Holyoake.)—This is partially a reprint of letters contributed to a periodical. At the date indicated by the title-page Mr. Newman journeyed from Dublin to Aleppo, to Bagdad, to Constantinople, and other cities of the East. His experiences were varied, and he details them pleasantly. His object in producing them after an interval of more than twenty years, has been "to give a vivid picture of things persons, and events as they then appeared." Whether or not "vivid," the picture is easy, pleasant and simple, and supplies a good deal of information, especially on the social aspects of Asiatic Turkey during the period of the writer's travels.

Hardwicke's Annual Biography for 1856, containing Original and Selected Memoirs of Celebrated Characters who have died during the Year 1855. By E. Walford, M.A. (Hardwicke.)—'The Annual Biography and Obituary' was in existence up to the year 1837, when, if we remember aright, it was discontinued. This volume is a modified revival of the idea. Its chief fault is in the title-page. The really "celebrated characters" who died in 1855 form a scarcely appreciable quantity, in comparison with the long alphabet of the nameless and unknown, whose memorials can only be of interest to their families and friends. It is well, perhaps, that friends and families should have such records compiled; but the public would have been satisfied with a smaller volume, and more select celebrities. Fielding, Bishop and Park, Miss Mitford and Mrs. Nicholls, Inglis, Pusey and

Hume, Truro, Molesworth, Rogers and Gaisford, De la Beche and Greenough, who, with Lord Raglan, are distinguished in the preface, deserved, no doubt, their places in the public chronicle with others not so distinguished—the Emperor of Russia and Don Carlos of Spain. But the miscellaneous list is grievously overburdened. With this exception, the volume appears to have been creditably compiled, much of the information having been furnished from private sources. Mr. Walford professes to be no more than an accurate and pains-taking compiler; though some of his memoirs are interesting, and are written in a very agreeable tone.

Venus and Adonis—Tarquin and Lucrece. Translated from the English of Shakspere by J. H. Dambeck. (Leipzig, Brockhaus; London, Nutt.)—This translation was made early in the century by a poet now deceased, but the present year is the first of its publication. The translator, while aiming at excessive accuracy, claimed for himself the licence, unusual with his countrymen, of occasionally lengthening his line with an additional iambus, on the ground that the abundance of monosyllabic words and abbreviated forms in the English tongue allows a Briton to say more in a given number of feet, than can easily be followed by a German within the same limits. As a specimen both of his accuracy and of his licence, we give the following stanza from the original and the version:—

This ill presage advisedly she marketh,
Even as the wind is hush'd before it raineth,
Or as the wolf doth grin before he barketh,
Or as the berry breaks before it staineth;
Or like the deadly bullet of a gun,
His meaning struck her ere his words begun.
Des schlimmen Zeichens nimmt sie wohl in Acht;
Denn wie der Wind sich legt, eh' Regen sich ergiesset,
Der Wolf erst grinst, eh' sein Geheul erwacht,
Die Beere platzt, eh' ihr der Saft entschiesset:
Trift sie, wie Blei aus tödlichem Geschütz,
Eh' ihm ein Wort entfuhrt, schon seiner Meinung Blitz.

The English is reprinted opposite to the German to allow facility of comparison.

History of the German People—[Geschichte des Deutschen Volkes]. By Jacob Venedey. Vol. II. (Berlin, Duncker; London, Nutt.)—This agreeable history, the commencement of which we noticed in September 1854, is making steady, though not rapid, progress. The present volume comprises the Saxon, Franconian, and Swabian periods of the empire, ending with the interregnum that followed the fall of the Hohenstaufen dynasty. Two more volumes, according to the publisher's promise, are to bring the narrative down to the present time; and we may remark, that the author, without sacrificing his fervour, exhibits greater power of condensation as he proceeds with his task.

Heligoland—[Helgoland]. By Friedrich Oetker. (Berlin, Duncker; London, Thimann.)—In a square and somewhat bulky volume this remarkable island is considered from every conceivable point of view. Its antiquities, its natural productions, the manners of its inhabitants, and the peculiarities of language, are all subjects of lengthened description and dissertation.

Helen Lincoln: a Tale. By Carrie Capron. (Low & Co.)—'Helen Lincoln' is one more of those miraculous American heroines, who, from poverty and the poor-house, grow up to be full not only of goodness, but of learning and wisdom also,—which, like their reading and writing, come by nature, without the preliminary necessity of the A, B, C, and the initiatory pot-hooks and hangers. It is a weak, foolish story, but with no particular harm in it beyond its foolishness.

The General Theory of Latin Accentuation; followed by Investigations on Accented Inscriptions, and an Examination of M. Bopp's Views on the History of Accent—[Théorie Générale de l'Accentuation Latine, &c.]. By H. Weil and Louis Benloen. (Paris, Durand; London, Nutt.)—Latin accentuation is a subject of less importance than Greek or Sanscrit. It presents fewer difficulties and curious facts, but the connexion between the Latin language and modern civilization, independently of other considerations, gives it a claim to attention which has been increasingly recognized

of late years. The authors of this treatise, who have previously contributed to its elucidation, here enter into an elaborate discussion of the nature and laws of Latin accentuation,—its function in Latin verse—the traces of its origin in early Latin—*—the changes it produced in the form, composition, and quantity of Latin words,—and the history of accentuation in the Latin and Romance languages down to modern times.* In an Appendix they consider some of the laws of Sanscrit accentuation, particularly with reference to the views advanced by Bopp. They have entered upon their task well prepared with a profound knowledge of the subject in all its branches, and have discharged it with an ability proportioned to its magnitude.

The House and Farm Accounts of the Shuttleworths of Gawthorpe Hall, in the County of Lancaster, 1582-1621. Edited by John Harland, F.S.A. Part I.—*Chetham Miscellany.* Vol. II.

—*The Farington Papers.* Edited by Susan Maria Ffarington. (Printed for the Chetham Society.)—These publications of the Lancashire and Cheshire Society are of very unequal merit. That the Shuttleworth Accounts should ever have been printed in this form can only be ascribed to the common mistake of supposing that antiquity confers interest on the most commonplace documents. Some of the entries, no doubt, throw light upon the habits of our forefathers, and afford interesting information concerning the prices of commodities and labour at the end of the sixteenth and beginning of the seventeenth centuries; but these are comparatively few, and might have been extracted in a small space. In their present position they are almost as inaccessible to mortals subject to drowsiness, impatience, and our other infirmities, as if they had remained in the chest or lumber-room of the Shuttleworths. And this is only Part I. of these Accounts! The two other volumes are of a different stamp.—The second volume of the *Chetham Miscellany* contains various documents illustrative of the Palatinate jurisdiction in Chester—the disputes concerning that jurisdiction—and the proceedings by which the Court of Exchequer began again to flourish, being restored "to the fairest flower in her garland, and her plume furnished again with the feathers she had lost." The documents are introduced by a well-written sketch of the history of the Palatinate rights by Mr. J. B. Yates, who edits them. An ancient poem on Flodden Field—a history of the Chapel of Denton—and a letter from one John Bradshaw (who, however, is not proved to be the regicide, though this appears probable) complete a very creditable volume.—The Farington Papers are, also, worthy of publication. A series of documents connected with the sequestration of William Farington's estate during the Civil War—the grant of "puparture" for the support of the wife—and payment of a composition to the commissioners at Goldsmiths' Hall afford interesting illustrations of those times. The papers connected with the shrievalty of William Ffarington teach us that, then, as now, the Lancashire witches were dangerous characters; there being no less than ten in jail.—On the whole, these books appear to us to be good examples of what Societies of this kind ought and ought not to publish.

Mr. G. M. Gorham's edition of *Xenophon's Cyropaedia*, lately published in the series of "Grammar School Classics," is an excellent adaptation of Dindorf's text to school purposes in this country. The assistance furnished in the notes is exactly what young people want—not given in such a way as to supersede the exercise of thought, nor burdened with a repulsive array of technical phraseology and references to works beyond their reach, but directly to the purpose, and in a form which all can understand, and, at the same time, none can well abuse. Occasional allusions to history, social and religious topics—not excluding even the late war—give increased value and interest to the annotations.—A very neat *Text-Book of Scripture Geography, with a Map*, now forms part of "Chambers's Educational Course," and may be safely recommended as a means of forming intelligent readers of Scripture.—*Praxis Greca: a Series of Elementary, Progressive, and Miscellaneous Questions and Exercises on Greek Grammar, Part II.*

Syntax, by the Rev. J. D. Collis, M.A., is the second of two books intended to accompany Wordsworth's Greek Grammar. The exercises contain the uninflected Greek for each English word, as in Ellis's Latin and Sandford's and Dunbar's Greek Exercises.

LIST OF NEW BOOKS.

Black's Picturesque Guide to North and South Wales, 6th edit. 3s. Borda's *Voice* from Australia, 2nd edit. fe. 8vo. 2s. 6d. cl. Calvert's Wife's Manual, 2nd edit. sq. 8vo. 10s. 6d. cl. gilt. Collier's Poisoning and Pudding in a Lantern, 12mo. 2s. bds. Durer's Humiliation, &c. of Our Redeemer, in 33 Prints, sq. 1s. cl. Fleming's Southern Africa, post 8vo. 1s. 6d. cl. Froude's Story of the English Millennial Engineering, 8s. cl. Gilligan's Galleries of Literary Portraits, new ed. 3 vols. Vol. 1, 8s. Greenwood's *Cathedral Petri*, Books 1 and 2, 8vo. 1s. 6d. Hibbert's Book of the Marine Aquarium, 12mo. 1s. 6d. Hog's Songs for the Young, 2nd edit. 8vo. 1s. 6d. Hunt's Guide to Government Appointments, 2nd edit. 12mo. 1s. 6d. Jones's Book-keeping by Single and Double Entry, 11th Book, edit. 1s. Keach's Exposition of the Parables, royal 8vo. 1s. 6d. cl. Kidd's Aviary and its Occupants, 3 parts, 1s. 6d. cl. Parrot's *Life and Death of the Human Mind*, 1s. 6d. After 2s. Parrot, Rev. B., Life, and Selections from his Writings, 10s. 6d. Quiggin's Illustrated Guide through the Isle of Man, 5th edit. 1s. Russian Chit Chat, by a Lady, fe. 8vo. 1s. 6d. Sims's Manual for the Genealogist, Topographer, &c. 8vo. 1s. 6d. Smith's Treatise on the Principles of Equity, 8vo. 1s. 6d. Stow's Survey of London, 12mo. 1s. 6d. 1 vol. 2s. 6d. Turnley's Language of the Eye, illust. by Gilbert, fe. 12mo. 1s. Vestigia, by "One of the Millions," fe. 8vo. 1s. cl. Warner's Hills of the Shetland, post 8vo. 6s. cl. fe. 8vo. 2s. 6d. bds. Willey's Letters from a Peasant, 12mo. 1s. 6d. Wotton's Manual of the Molusca, illust. 12mo. 6s. 6d. cl. Yonge's Shadow of the Yew, and other Poems, post 8vo. 6s. 6d. cl.

THE REV. DR. BUCKLAND.

FEW men have filled a wider space in public estimation for the last twenty-five years than Dr. Buckland. His name is intimately associated in the popular mind of this country with the progress of Geology. He may not have possessed the natural acquirements or the philosophical acuteness of many of his contemporaries; but he possessed a heartiness of spirit, an indomitable energy of purpose, a geniality of character, which made him, even amongst men remarkable for these gifts, the most remarkable. These qualities made Dr. Buckland the most prominent of a band of philosophers who gradually worked their way in geological science, redeeming it from the puerilities of a popular hypothesis, and placing it high amongst the physical sciences. In this great work Buckland was associated with Lyell, De la Beche, Sedgwick, Murchison, Phillips, and Conybeare.

Although we have now to record the death of Dr. Buckland, which took place on Thursday, the 14th inst., at Clapham, yet he had many years closed his scientific career. In the year 1850 his brain gave way under the excessive activity to which it had been exposed, and from that time to this he has never recovered sufficiently to attend to his scientific pursuits.

Dr. Buckland was born at Axminster, in Devon, in the year 1784. He received his early education at Winchester, and in 1801 obtained a scholarship in Corpus Christi College, Oxford. He took his degree of B.A. in 1803, and was elected a Fellow of his College in 1808. At this time Oxford was the most unpromising school in the world for natural science. Nevertheless there were chairs of Botany, Chemistry, and Mineralogy to indicate to the student that all human wisdom was not bound up in Classics and Mathematics. The tastes of young Buckland led him to the study of Mineralogy, and in 1813 we find him appointed to the Readership of Mineralogy, and in 1818 to the Readership of Geology. In these positions he succeeded in attracting attention to the departments of physical science which he taught. But as he excited interest he excited opposition, and every onward step that he made towards giving the science of geology a position in the University, raised an opponent to its claims. Through his long life he had to fight for his science in his Alma Mater. But he gained the victory,—and Strickland and Phillips, his successors, have obtained a universal recognition of the value and importance of their teachings.

In 1820 Dr. Buckland delivered a lecture before the University of Oxford, which was afterwards published under the title of 'Vindiciae Geologicae; or, the Connexion of Religion with Geology explained.' In this work he showed that there could be no opposition between the works and the

word of God, and that the influence of the study of natural science, so far from leading to atheism and irreligion, necessarily led to the recognition of God and to his worship. At this time, however, Dr. Buckland still adhered to the old hypothesis of the universality of the Deluge. He, however, became convinced of the untenability of this position, and in his Bridgewater Treatise, published in 1836, entitled 'Geology and Mineralogy considered with reference to Natural Theology,' we find him adopting the views of Lyell and others.

Dr. Buckland's name will be ever associated in this country with his discoveries of the remains of animals in the caves of Kirkdale, and other parts of England. Of these discoveries he first gave an account in the *Philosophical Transactions* in a paper, entitled 'Account of an Assemblage of Fossil Teeth and Bones of Elephant, Rhinoceros, Hippopotamus, Bear, Tiger, and Hyena, and Sixteen other Animals, discovered in a Cave at Kirkdale, Yorkshire, in the year 1821.' These discoveries and others served as a basis for a work published in 1823, entitled 'Reliquiae Diluvianae; or, Observations on the Organic Remains attesting the Action of an Universal Deluge.' Although the occurrence of these remains are now accounted for on a different theory, the great value of this work remains as a record of the first discovery of the remains of animals of which most have since disappeared from this part of the world, and thus revealing the nature of the animal inhabitants of Great Britain previous to the arrival of man. In addition to the above account of the bones of animals found in caves in Great Britain, Dr. Buckland described many from the Continent, as the bones of hyenas found in the cavern of Lemel, near Montpellier, and the bones of bears found in the Grotto of Osselles, or Quingey, near Besançon.

His contributions to the *Proceedings of the Geological Society* were very numerous, and in the first volume of the 'Bibliographia Geologica et Zoologica,' published by the Ray Society in 1848, we find references to sixty-one distinct works and memoirs. Dr. Buckland's social habits often led him to work with others. Thus we find him early in his career working out the south-western coal district of Gayland in company with his friend Conybeare. In conjunction with the same distinguished geologist, he published 'Sectional Views of the North-East Coast of Ireland' and 'Illustrations of the Landslip on the Coast of Devonshire.' With the late Sir H. De la Beche, he published a paper in the *Transactions of the Geological Society* 'On the Geology of the Neighbourhood of Weymouth.' In conjunction with the late Mr. Greenough, he published a paper on 'Vitreous Tribes in Sand-hills near Dirg, in Cumberland.' With Mr. Sykes, a paper on the interior of the dens of living hyenas. His papers generally display great powers of observation, with unwearied industry; and many of the general conclusions arrived at by the author have now become part and parcel of the great laws of geological science.

In 1825 Dr. Buckland accepted from his college the living of Stoke Charity, near Whitchurch, Hants; in the same year he was promoted to a Canonry in the Cathedral of Christ Church, and married Miss Mary Morland, of Abingdon. In 1818 he had been elected a Fellow of the Royal Society; and in 1829 he was chosen a member of the Council of that body, and was re-elected on each successive occasion till his illness in 1849. In 1813 he became a Fellow of the Geological Society, and was twice elected President of that body. He took an active interest in the foundation of the British Association for the Advancement of Science, and was one of those who took the bold step of inviting this body to hold its second meeting in the University of Oxford. On this occasion he was President of the Association. From that time to 1848 he was constantly present at the meetings of the body, and read many of his papers before them.

In 1847 Dr. Buckland was appointed a Trustee of the British Museum, and took an active part in the development of that department more especially devoted to Geology and Palaeontology. He also seconded, to the utmost of his power, the efforts of Sir Henry De la Beche to establish the

Museum of Economic Geology, which is now, in conjunction with the Government Geological Survey, working so successfully in Jermyn Street as the School of Mines. In 1845 Dr. Buckland received, at the hands of Sir Robert Peel, the Deanery of Westminster, vacated by the present Bishop of Oxford. This brought him to reside in London, where he immediately took a lively interest in all questions involving social amelioration. He exerted himself to gain a more free admission for the public to the monuments in Westminster Abbey. He joined the ranks of sanitary reformers, and brought his great knowledge of geology to bear on questions of water supply, sewerage, and other health questions. Dr. Buckland seems not to have devoted himself to questions of technical theology. His views on this subject are chiefly contained in the Bridgewater Treatise and the 'Vindiciae.' Amongst the list of published works we find one sermon, and that devoted to the subject of death: it was published at Oxford in 1839.

OUR WEEKLY GOSSIP.

OXFORD and London—monastic life and modern life—cloisters and cottages—musty old libraries in which nobody reads, sprightly new railway stations which everybody rides—the thirteenth century and the nineteenth century—such is the popular contrast: a contrast out of which the democratic mind contrives to extract much mistaken comfort. But is exclusive Oxford all dark cells, Gothic windows, serge gowns and bigotry—is liberal London all light, activity, and beauty? Facts do sometimes oddly spoil these popular contrasts. Take the sphere in which we, as literary chroniclers, are chiefly interested. Oxford, with all its monastic prejudices, has a very good, a very useful, and very much used public library. Democratic London has failed in every parish to found a similar institution. The man who toils under the walls of Christchurch or Magdalen has the solace of books and papers, free of all charge, in a cosy room. The man who toils in Cheapside or the Strand must go for his reading to a public-house. But, democracy may cry, this is the work of town, not of gown. What says our friend to another fact—the new fact, which brings the contrast to our mind? London possesses the National Library, yet closes it against the millions who pay for it, and many of whom, for want of it, die an intellectual death. For years we have urged the opening of these literary treasures—or such part of them as may be safely opened—to the workman in his only leisure hour—at night. London is deaf to the appeal. London does not know the working man. Oxford has also a library, not national, not bought with public money; and in that bitter and exclusive spirit with which democratic London loves to charge her, she has opened the Ratcliffe Library to working men once a week at night, from seven to nine. We are not ourselves very monastic, but we should like to see London imitate the dark and bigoted spirit shown by Oxford in some of these matters.

The National Reformatory Union—an institution for the treatment of young criminals—commenced its session on Wednesday, at Bristol. Lord Stanley delivered an opening address in which he treated the topic with unusual skill and freedom.

Mr. Edward Kay Kendall, B.A., Scholar of St. John's College, has been appointed Professor of Mathematics at Trinity College, Toronto.

While our readers were admiring the modesty which led "the heroes of Kars" to ignore all merits except their own,—a letter was on its way from the Bosphorus, and has been this week printed in the *Times*, from General Kmety, in which the aged soldier addresses Sir W. F. Williams in a tone of calm remonstrance, worthy of his fame, on the historical suppression under which he, in common with others, is made to labour. Injustice of this sort, however, works its own cure. We hear with satisfaction that a subscription is being raised in the name of General Guyon, with a view to present that distinguished officer with a sword of honour.

Mr. Kelley laid before the Mechanical Section of the British Association an account of his recent explorations in Central America with a view to

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ascertain the feasibility of a ship-canal across the Isthmus. An abstract of this communication appears in our report; but we may state for the benefit of such readers as reserve our sectional reports for a dull day, that the Section, with Mr. Remond in the chair, voted unanimously to recommend the Council of the Association to aid in carrying on the explorations of the Valley of the Atitlano.

Mr. Bosanquet writes in explanation of an incident, to which Dr. Whewell had already referred:

"Claymore, Enfield, Aug. 21.

"I was surprised to see in your journal of Saturday last that, at the meeting of the British Association, Dr. Hincks has again opened the question of the true date of the eclipse of Thales, a subject which had been considered definitively settled by two of our ablest astronomers in the years 1852 and 1853. Dr. Hincks conjectures that the eclipse of May B.C. 603, may yet prove to be that which terminated the war between the Medes and Lydians, as mentioned by Herodotus, and says that he 'should be glad to learn the track of the moon's shadow' during that eclipse. This is indeed a retrograde movement in science, considering that not only the track of the eclipse of B.C. 603, but of every eclipse bearing upon the question, between the years B.C. 630 and 580, has already been examined by the Astronomer Royal, and the result of his investigations published in the *Philosophical Transactions* for the year 1852, which have been entirely overlooked by Dr. Hincks. I think it necessary to call attention to the facts connected with this subject, as some of your readers interested in rearranging the chronology of this period of history, may be led to suppose that the date of the eclipse of Thales is still an open question. In August, 1852, Mr. Hind determined, from the then most approved tables, that the eclipse of B.C. 585 was the only one which could satisfy all conditions required; adding, at the same time, that 'no probable correction of the elements of the moon's orbit at a future period was likely to affect this conclusion.' Mr. Airy in the same year read his paper before the Royal Society, coming to the same result. And at a lecture, delivered at the Royal Institution in 1853, expressed his opinion that 'the date B.C. 585 was now established for the eclipse of Thales beyond the possibility of doubt.' It may be interesting to your readers also to know, that within the last few months doubts have been entertained with regard to the correctness of these conclusions, owing to the discovery of an error in Flana's calculations, in which an algebraic term had been accidentally omitted; the correction of which, it was thought, might very considerably results founded upon his figures—so much so, indeed, that the Astronomer Royal himself thought it necessary to institute a new series of calculations, both with regard to this eclipse and the eclipse of Agathocles, in B.C. 310. These calculations have now been brought to a conclusion, and the result is to vary slightly the path of the shadow in B.C. 585, as before laid down, and the decision still remains unaltered, that the battle described by Herodotus could have been fought only in the year B.C. 585, and that the position of the battle-field must have been either in the centre of Asia Minor or towards the south-east corner of the peninsula.

"I am, &c., J. W. BOSANQUET."

We are requested to state that Mr. Napier's 'Memoirs of Montrose' is "not a reprint, but a new and very much enlarged and extra-embellished (for the first time) work on Montrose." We give this information as it reaches us, without affecting to understand it. A work that is now said to be "enlarged" must, we suppose, be reprinted. A work that is now described as "extra-embellished for the first time" must, we also suppose, have been printed before with or without embellishments.

We have on more than one occasion had to record the recognition by Continental learned bodies of the literary labours of the Rev. William Cureton, Canon of Westminster, and one of Her Majesty's chaplains. The University of Halle has just conferred upon him the honorary degree of Doctor of Divinity, in acknowledgment of the services ren-

dered by him to the cause of religion and Oriental learning by the publication of Arabic and Syriac manuscripts preserved in the British Museum.

The following note, correcting a clerical error, calls attention to an excellent regulation of the Manchester Police:—

Hewlett Road, Cheltenham, Aug. 17.

Permit me to point out to you an error which occurs in this day's *Athenæum*, under the title of "Manchester Streets." When in Manchester a few weeks ago I noted these excellent "Police Notices," which are, I think, well worthy the adoption of police authorities in all large, or especially commercial, towns. They are worded as follows:—on one side of the label, "Drivers must keep to the left"; on the other side of the label, "Foot-passengers must keep to the right."

I am, &c., H. P. W.

—As a step towards Street Reform this regulation should be adopted at once. A similar rule has been tried on London Bridge with the best results. Something might also be done for the ease of walkers. During parts of the day Oxford Street and the Strand are all save absolutely choked with human beings; and the thoroughfares remain the same while the tide of life is swelling every hour. London contains 250 more souls than it did yesterday. To-morrow it will contain 250 more than it does to-day. A town as large as Brighton is added to London every year, a city as vast as Manchester every four years. And much of this addition, by the very law of social existence, tends incessantly towards the central thoroughfares. How, in a few years, will the tide flow through the contracted space? The rule of all persons walking the same way keeping to one side—Indian file—would do something. At Dresden, the police compel all persons to walk on one side of the bridge, so that the stream of passengers flows in two currents, as trains move on the up line and the down line. Some rule of this kind, if adopted in our streets, would assuredly prevent much jostling, ill-humour, and loss of time.

The Cambrian archeologists have been enjoying themselves during the week, according to programme, in a series of pleasant excursions, enlivened by a series of historical discussions. A local museum was formed at Welshpool, which added to the interest of the gathering.

Mr. Notley has sent us a long criticism on three points of M. Louis Blanc's 'Histoire de la Révolution Française':—the imprisonment, the trial, and the execution of the King. Mr. Notley quotes Alison and takes the sentimental side: he thinks M. Blanc must be wrong in saying that Paris was calm on the day of the King's trial, not only because Alison says it was riotous, the people "yelling for blood," and so forth—but because "the Frenchman is a Celt, and possesses all the impulsive tendencies and enthusiastic temperament of that race." In the same way, he thinks the King died like a saint, because he read in a review two years ago that somebody who wrote at the time said so. An explorer of historical archives so laborious and conscientious as M. Blanc is not to be disturbed by second-hand compilers. The new and startling facts now adduced on these points may be open to correction—but no one is at liberty to impugn the good faith of such a writer as M. Louis Blanc on the authority of such a writer as Sir A. Alison.

The Council of Queen's College, Birmingham, have received from Miss Coutts a donation of 600*l.* towards a fund, now in process of being raised, to complete their buildings and museums.

Carlisle Cathedral is looking up, as the phrase goes, and so are all its visitors, since the greatest novelty is a capacious coved ceiling, much higher than the flat plaster which so long concealed the original one. It is now covered with every possible brilliancy of azure, red and gold. The balance of colour, for designing it can hardly be called, has been regulated by Mr. Owen Jones, and is so far, in itself, very satisfactory. But to the ceiling all the finery is strictly limited; not a shaft of a column, capital or moulding relieves the eye with gold or tint from the monotonous reddish tone which pervades the walls, and not an ornament decorates the floor, where the eye most naturally falls. The only approach to colour decoration beneath the azure vault is some indifferent painted glass in the east window of the south aisle,

and the completion of the head-lights of the glorious east window, which is so well known to all lovers of ecclesiastical architecture. The gaudy decoration of the parts of sacred edifices which are least seen, is only too prevalent a fashion in the present day. In the case before us, multitudes of angels, well carved, no doubt, by Theodor Pfeiffer, the Belgian, decorate the cornices from which the vault springs, and also the ends of projecting beams which have a very useless appearance. All these angels are painted, as heralds would say, *proper*, and have, at best, a very drollish appearance. The organ is placed at the east end of the choir, and may be made, with its multitudinous pipes, the object of very decided embellishment. It is proposed to decorate the window of the north transept with painted glass, to the memory of the late Bishop, and to enrich in like manner that of the east end of the north aisle, to honour the illustrious Paley, whose burial-place is at present only marked by his name on a slab in the pavement of this part of the Cathedral. If such decorations be undertaken, let the memorialists consider well their steps, and guard against such enormities and inconsistencies as in the most recently inserted window, and the one in the north transept to the memory of the Chancellor of the diocese. Gaudy colours are now so common, that a little pure drawing and original composition would be refreshing. A competition of cartoons in outline and shadow only might afford some test of the resources of the various manufacturers, and exhibit with equal clearness the taste of the judges. We have before had reason to animadver on the rapid pace with which every pane of plain glass is made to effloresce, and it is still to be feared that no room will be left for the really good artist when he arrives.

BRITISH INSTITUTION, Pall Mall. — The GALLERY with a Collection of Pictures in Ancient, Modern, and DECEASED BRITISH ARTISTS, is OPEN daily, until Saturday, August 30, from Ten to Six.—Admission, 1*s.*; Catalogue, 6*d.*

DR. KAHN'S ANATOMICAL MUSEUM, 3, Coventry Street, Leicester Square, is open for Gentlemen only, from 10 till 10. Contains upwards of 1,000 models and specimens, illustrating every part of the Human Frame in Health and Disease, the Bases of Men, &c. Lectures are delivered at 12, 2, and half-past 7, by Dr. SEXTON, F.R.G.S.; and at 4 P.M. precisely, by Dr. KAHN.—Admission, One Shilling.

FINE ARTS

NEW PUBLICATIONS.

Cottage Pictures from the Old Testament. J. H. & J. Parker.

This series of twenty-eight folio pictures is really extraordinary. It exhibits a return to the old and, we had hoped, bygone days when line engravings were coloured gaudily by hand, and no attempt whatever was made to produce a moderating tint, which constitutes so important an element in what artists call tone. The old illustrations which enlivened our boyhood's books of Aladdin, Jack the Giant-killer, and the Forty Thieves, and, above all, West's theatrical characters and scenery, were rendered glorious by the same process: West's plates, we are bound to admit, were of a character, as far as our present glances will allow into shops where such things are sold, very superior to the productions of the present day.

Gaudiness in mere patches of red and crimson, sulphurous yellow, dazzling blue and purple, is less objectionable provided such gaieties become the means of leading the poorer classes to an acquaintance with the higher qualities in Art; but to have these garish colours allied with designs of the weakest description and with indifferent drawing is a grievous mistake; and the fault is rendered less excusable, since, in some of the compositions, the works of Raphael have evidently been before the artist, and he has intentionally deviated from them,—in what direction may easily be imagined. To add to the finery, many of the dresses have gold borderings to them. A little more expense devoted to the groundwork of the plates themselves would have been more generally satisfactory. The line-engraving portions seem to have been done in lithography, by B. Hummel; and it is to be regretted that they do not show the same earnestness of purpose that was recognized in the two series long since completed—

'Cottage Prints,' and 'Pictures for the Poor.' The conception of particular subjects in these 'Cottage Pictures' is unworthy of their religious dignity, especially the 'Brazen Serpent,' and 'The Ascension of Elijah.' For the perversion of Raphael's design it will suffice to name 'Abraham and the Angels,' and 'Isaac blessing Jacob.' The price at which a work is sold may often influence the judgment pronounced upon it. The work in question has reached us without any such indication; but, even if cheap, Art that is not in itself healthy should be eschewed.

GLASGOW ART-UNION PICTURES.

The prize paintings of the Glasgow Art-Union—many of which we should by no means prize—are exhibiting at the Water-Colour Gallery in Pall Mall. The collection contains so many old favourites which we have before criticized, that we scarcely know how to avoid repetition. Among the poor pictures is a collection of portraits, called *Burns in Edinburgh* (No. 7), by Mr. Johnston. The subject is Scott, as a boy, reading in an old book-shop in Parliament Square, where Blair, Mackenzie, Monboddo, Bruce, and Adam Smith have met. The figures are very spectral and staring, and do not come together, although they are all within one frame. Burns looks like a blundering grazier, and Scott like a born gaby.—Mr. Fae's *Conquered, but not subdued* (1) is a clever, smooth picture,—good, but too slick and pretty in expression. The insolent, stormy fret of the boy is well given; though the affected moral tone of the picture is painfully puritanical.—Mr. Frost's *Graces and Loves* (4) are delicious polished clays.—The gems of the room, however, for rough character and new truth are Mr. Nicol's *Irish Sketches* (184)—*passim*—&c. The cunning, the sly wit, the droll inconsequence of eye and mouth, the brooding discontent, the roaring fun, are all given in a way that would delight Carleton himself. For here is the sharp-featured fellow, in the old dress coat, dressing the salmon-fly,—the relic of '98 thinking of the brush with the red coat,—the wrinkled gossip telling delightful lies about changelings and Leprechauns,—and fisher-boys with eyes staring at the wind.—Mr. Christie's sketch of *Argyle Asleep* (173) does him credit:—it is almost as good as Mr. Ward's well-known picture.—In Mr. M'Innes's *Infant School* (5), the blushing boy who is being chidden is nicely remembered; but the other figures are rather coarse and common.—Mr. Sant is fresh and original as ever in his free and almost careless idealisms of youth and childhood. *The Girl at the Mountain Well* (18) is pure and sauntly. *Summer Trophies* (13) looks like a dash of a few hours, with here and there a finished touch. This is a beautiful mellow brunette face, full of shaded sunlight, wreathed with the flame of a crown of poppies, cored with black. No one paints the living face of real ladyhood better than Mr. Sant. It would be better if he did not think quite so easy a thing, and painted with more religious and self-forgetting care.—Mr. Gilbert, versatile as he is ingenious, astonishes us with a *Peasant Girl crossing a Burn* (42), which has a lamplight sort of colour, and much beauty of tone and manner.—Mr. Leitch's *Villa Fountain* (21) is most crude and unpleasing in colour,—and so is Mr. Paton's lavender-coloured *Summer Night* (35), which reminds us of the 'mitigated affliction' department of a Regent Street shop.—Mr. Wyburd's pleasant voluptuousness—pleasant to look at, but ephemeral as hot-house flowers—are highly finished, and shows considerable appreciation for a certain sort of unmeaning wanton beauty.—Mr. Ross's *Dancing Lesson* (17), though no more like Nature than Shenstone is like Nature, is a good thought. The piping boy, the spectators, the enraptured connoisseur, and the gleeful little dancer herself, are well contrasted.—Mr. Woolmer is, as usual, poetical, after his manner, in his *Thought from Boccaccio* (66),—and Mr. Provis amazingly perfect and like himself in his *Breton Interior* (55).—Mr. Wilson (24) gives us finely the long lash and roll of his soft, warm seas, with their hoar-green light and their billowy undulations,—now all plain, now all white-peaked mountains.—

Passing reluctantly by Miss Muriel's regal *Flowers* (89), Mr. Rolfe's *Salmon* (93) and Mr. Earl's *Scotch Terriers* (96), we come to a powerful landscape, perhaps the most striking in the room—*Scene in the Isle of Arran* (53), by Mr. Hargitt:—the blue laughing sea, the speckle of red heather, and the great blocks of brown rock, form pleasant masses of colour. With more elaboration this picture would have risen beyond that of a manufacture. The figures are rag-bags and scarecrows, not Highlanders watching for Jinkin Jennie that brims with the moonlight, and cheats the gaugers. Mr. Simmons's *Rainbow* (87) is very soft and rich in colour, and does not look like a tin plaything, as other rainbows have done before now. Mr. Naish's *Cupids in a Shell* (82) is a poetical title, though two cupids nestled in shell, whose sail is a dove's feather, steer it over rather a Gowland's Lotion sea. This sea is a mistake in colour and quantity. Mr. Cameron's *Crimean Story* (49) is all very well, but there is an air of cant about it, and Goldsmith's veteran's story is old enough for a handsome retiring pension. The *Expectant Wee Things* (128), rather hard and dry in colour, is another instance deserving attention from the Society for Suppression of Cruelty to Images. Never was any London cab-horse on a wet day so overworked as this image of the shadow of a coming figure so well treated by Phiz in his scene at 'Capen Cuttle's.' Here is the 'double' of a returning father with outstretched arms cast upon the wall, while the little ones rush out in a storm of delight to drag him in to mother.—For the present year, the members of this Art-Union are to receive engravings of Mr. Cope's *First Born* and Mr. Leitch's *Villa Fountain*—both criticized by us some months since. There are, also, bronzes and Parian statuettes to be distributed, as well as 1,200 chromo-lithographs from a painting by Mr. Gavan, of *Returning from School—Storm coming on*. In the wholesale spirit of these commercial Unions, the society announce that in December last they bought for prizes 208 paintings, 15 bronzes, 40 statuettes, 1,200 lithographs—making a total of 1,463 prizes, at a cost of 9,396*l.*

FINE-ART Gossip.—The Perugino exhibited in the National Gallery on Saturday last is a fortunate link between the two departments we have recognized in that institution,—namely, a museum to illustrate history, and a gallery for the improvement of Art and gratification of taste. No one, we imagine, can enter the great room, where the picture now is, without being struck with the extraordinary brilliancy and intensity of its colour, and the delicacy with which the features are modelled. Notwithstanding the conventionality of the general arrangement, inseparable from the works of the genuine pre-Raphaelites, there is a wonderful earnestness of motive in the different figures. The picture consists of three arched compartments united in one frame. The centre represents the Virgin kneeling before the Infant Saviour, who is supported by an angel. On clouds in the sky above, three angels are singing the 'Gloria in Excelsis,' as in the picture in the Gallery of the Vatican. The left-hand compartment contains a standing figure of St. Michael alone, similar in his stride to the St. George of Donatello and Perugino's St. Michael in the Vallombrosa 'Assumption of the Virgin'—at Florence. The right-hand compartment contains a beautiful group of the Archangel Raphael leading the young Tobias. An exquisite drawing, with silver point, and white, on tinted paper, by the hand of Raphael, is in the Collection at Oxford, and serves to associate the labours of the distinguished pupil with the design of the master. None but Raphael, it seems, could have painted the angel's head. The Oxford drawing has been very poorly engraved in Fisher's 'Seventy etched Fac-similes,' plate 17 of the Raphael series. The picture itself is mentioned by Vasari as painted, by Perugino, for the monks of the Certosa, near Pavia. It was purchased at Milan, for the National Gallery, for the sum of 4,000*l.* from the Duke of Melzi, in whose family it had remained during the

last seventy years. Von Rumohr states, that the lunette containing a figure of the Almighty with the symbol of the Holy Ghost, yet remains at Pavia. What the Predella subjects were is not known. The central compartment has been somewhat reduced for the sake of uniformity with the rest. The picture has suffered much injury, but has only been patched up. Very fortunately, it escaped the restorer's hands, and found its way direct into the Gallery. The Committee wisely determined to exhibit the picture in its genuine state, so that the patches of modern colour assist the general effect of the picture at a distance, and do not conceal the actual state on a nearer examination. The colours are remarkably rich and mellow, and the extremities carefully drawn. The kneeling figure of the Madonna is unfortunately cut off above the knees, which gives the whole a painfully cramped appearance. The draperies are all remarkably woolly, and disposed in very large folds. The painting of an iris, and the fish in the hands of the youthful Tobias, should indeed put the pseudo-pre-Raphaelites on their mettle. Four other pictures, of minor importance, also made their appearance last week at the sides of the Benozzo Gozzoli. A Virgin and Child enthroned, by Francesco Tacchoni, of the school of Cremona, is inscribed O.P. FRANCISCI TACCHONI. 1489. OCTV.:—a portrait of Ludovico Martinengo, by Bartolomeo Veneziano;—a Virgin and Child, seated, by Girolamo dai Libri;—and the Virgin and Child between St. Paul and St. Jerome, by Vivarini. The latter is painted with great care and stippled like the tempera-paintings of Botticelli, the hands are carefully studied, but St. Paul's head remarkably weak. The red hat of St. Jerome is without the usual rim, and the gold of each nimbus is radiated with indented lines. The picture is inscribed in connected letters, OPVS BARTOLOMEI VIVARINI. DE. MVRANO. A small picture, by Marco Basaiti, of St. Jerome reading, has been for some weeks in the great room, near the recently-acquired John Bellini. From the manner of labelling the pictures, and this one in particular, "painted from 1470 to 1530," it seems as if that particularly small work had occupied sixty years in progress. At the present rate of increase in our National Gallery, the collection must soon burst its bounds and make for a healthier air. The spare pictures—the dress that accompanied some of the specimens from Venice and Minden—will be sold, it is said, in the beginning of next year.

A distinguished Member of the Royal Scottish Academy at Edinburgh has become possessed of a fine picture, representing a Holy Family. Some call it a Raphael, but an eminent connoisseur assigns it, with more probability, to Beltracio, the pupil of Leonardo da Vinci, a celebrated amateur painter of the Lombard School. The owner, it is said, requires a large sum for it.

The Commendatore Luigi Canina, Keeper of the Museum of the Capitol at Rome, and so well known by his extensive works on the Architecture of Italy, is now in England, chiefly for the purpose of superintending some extensive architectural decorations, for the Duke of Northumberland, at Alnwick Castle. The Duke also intends to fit up two or three apartments in the venerable castle of Warkworth,—the scene of so many historical associations, and familiar to all readers of the Second Part of Shakespeare's 'Henry the Fourth,' as the locality of

Rumour painted full of tongues, and of the pathetic scene in which Northumberland receives information of his son's death.

MUSIC AND THE DRAMA

DELPHI.—Another new American drama, named 'Ireland as it is; or, the Middleman,' in three acts, and said to have been played 763 nights in the United States, was produced on Monday. It comprises a great number of characters, and many situations, setting forth the evils of absenteeism and the villainies of the middleman, who, to promote his own interests, encourages incendiarism, imprisons the honest tenant, and pursues him to the death in the law-courts on false charges of robbery and rebellion. One of the large group

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of Irish sufferers is *Ragged Pat* (Mr. Barney Williams), whose cheerfulness under any circumstances is indestructible, and whose charity dispenses his last potato to a poorer neighbour,—a man not to be daunted by any peril, and whom no poverty can subdue. The make-up and assumed manner of this warm-hearted, impulsive creature, were in all respects complete; and Mr. Williams may be congratulated on having added another veritable portrait to his Hibernian gallery. Mrs. Williams appeared in an altogether new line:—not as the “Yankee gal,” but as a spirited Irish woman, who travels as she best may to London, to appeal to her landlord against the oppressions of his agent. *Judy O'Trot* is a worthy companion-portrait of *Ragged Pat*, with the same spirit, the same generosity, and the same fearlessness of character. To these two the principal situations of the piece are indebted for importance; and at length, of course, *Stone*, the Middleman (Mr. C. Selby), is defeated. A mixture of respectability and rascality has in such parts to be contrived, and a special individuality manufactured, which, while it gathers no sympathy, must yet extort admiration from the judicious for the artist. It becomes a duty, therefore, to record the perfect success of the actor, when such has been achieved. We regret we cannot say as much for Mr. Garden, who—as *Dan O'Caloran*, an aged farmer, and the venerable hero of the drama—failed to give dignity to a character which was intended for a model of patience, and about which the whole interest of the action ought to thicken. We fear that he was not quite perfect in the text, and from his negligence the serious part of the play suffered greatly in its effect. But the spirit of the two principals preserved the whole from failure, and, indeed, bore it through all difficulties with remarkable vigour. More than once they carried their hilarity to an extreme point, but the house went with them, and the applause and laughter were as general as they were genuine.

MUSICAL AND DRAMATIC GOSSIP.—Plans, drawings, and elevations of the *St. James's Hall*—of which Mr. Owen Jones is to be architect—may now be seen. The dimensions are ample, the proposed interior of the room looks rich, if not architecturally pure, and the means of exit are apparently sufficient. The last announcement will gladden the myriads who have been crushed, roasted, or frozen on the wretched staircases and in the sepulchral outlets to Exeter Hall,—and may remind the proprietors of that building that they have been too conservative in the deaf ears which they have turned to all remonstrances on the subject. How the arrangement of the orchestra and the organ may succeed remains to be proved. We should have fancied, to judge from the plan, that they were too cavernous did we not hear how strangely well the music sounds in that oddly-contrived place, the Surrey Hall.

Your late correspondent, N. R., (writes a friend), will find his remarks on the cause of Puritan organ-phobia anticipated, and its data confirmed, in an article in the *Athenæum*, June 24th, 1854, [No. 1391], on Seidel's ‘History of the Organ.’ There the extent to which the managers of Papistical Church entertainments loaded the organ with the silly machinery of performing cherubim, and like profanities, for the purpose of enabling it to bear a part in their shows, was signified as one of the causes why Puritanism and Protestantism conceived such a spite against the instrument; in their detestation of monkeying, including a persecution of music, which was as inconsistent as it was frantic.—What a curious collection, by the way, could be made of the influences of sectarian scruples on taste,—taking, as the most extreme example, the confession of the old-world preacher belonging “to the Society of Friends,” of “some uneasiness” at the sight of a field of red clover,—one among many like anecdotes treasured up in the inner world of Quakerdom!

Y. L. Y.

A second and enlarged edition of the ‘Biographie des Musiciens,’ by M. Fétis, is going to the press; we trust, with many corrections (especially in all that concerns English music and musicians). We have found the general value of the Dictionary, as a work of reference, great, and think that any labour necessary to the perfecting of it, so far as is possible, is well worth giving.

Our contemporaries announce the return to England of Miss Katharine Hayes, from Australia; and the arrival and successful *début* of Signor Tamberlik at Rio Janeiro.

To gratify a Correspondent, by whom we are thought to have undervalued the activity and energy of one whom he numbers among the worthy musicians of Germany, let us return for a moment to the decease of Dr. Schumann, not to re-open controversy on a subject regarding which we have sufficiently expressed our opinion, but to record that the list of his published compositions is a very long one, including many works of most important scale,—such as Symphonies (one of which, we have heard in Germany, was intended to describe Cologne Cathedral), descriptive overtures, concertos for the pianoforte, with orchestra, sonatas for the pianoforte, with one or more instruments, studies, and fantasias, also, for the pianoforte, stringed quartetts, a mass of Lieder (some of which have been repeatedly described to us as beautiful), an opera, ‘Genoveva,’ and two full cantatas, ‘Paradise’ and the ‘Rose-Pilgrimage.’ We are not acquainted with any sacred music from Dr. Schumann's hand.—It is stated that the original score of Mozart's ‘Idomeneo,’ with the ballet music (which seems all but unknown), is now in the market at Berlin.

A new *ballet*, ‘Les Elbes,’ has just been produced at the *Grand Opéra* of Paris for Mdlle. Ferraris. The music is by *Il Conte Gabrielli*.—Mdlle. Lebrun, a dramatic pupil of the *Conservatoire*, is about to make her appearance at the *Théâtre Français* in high tragedy.—M. Achard, the well-known French actor, died suddenly the other day in Paris. He fell from his chair, and was taken up dead.

TWENTY-SIXTH MEETING OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE.

SATURDAY.

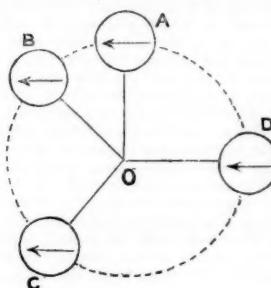
SECTION A.—MATHEMATICAL AND PHYSICAL SCIENCE.

‘Provisional Report on Observations with the Seismometer,’ by Mr. R. MALLER.—This paper was read by the SECRETARY, who stated that a recommendation for a continuation of the grant had been sent up by the Committee of the Section to the Committee of Recommendations.

‘On the Reasons for describing the Moon's Motion as a Motion about her Axis,’ by the Rev. Dr. WHEWELL.—The moon's motion may be described, in one way among others, by saying that in each month she revolves about the earth nearly in one plane, turning always the same face to the earth. But if a body rigidly fastened to a rigid radius which revolved about the earth nearly in one plane, such a body would during that revolution turn always the same plane to the earth. Now, would such a body be described as revolving upon its axis during such a revolution? By many persons it would not be so described. But the moon is described by astronomers as revolving about her axis in the course of every month. What are the reasons for such a description? The reasons are briefly these:—1. The moon is not fastened to the earth rigidly, nor fastened at all. 2. The moon being thus detached, the reference of the moon to the earth as a centre of revolution is arbitrary. 3. The other celestial bodies which revolve about centres also revolve about their axes, and the rule regarding them as not revolving about their axes when they turn always the same face to the centre, would produce confusion: it would, for instance, compel me to say that the earth revolves upon her axis 365½ times in a year, whereas with regard to the fixed stars she revolves 366 times. Also, when a body revolves about a centre turning always the same face to the centre, then is mechanical force required to make it so turn; but no mechanical force is required to make it remain parallel to itself while it revolves round a centre.

1. The moon is not fastened to the earth rigidly, as the ancients supposed when they invented the crystalline spheres as the mechanism by which the heavenly bodies revolve, and by which they are connected with one another; and as the body representing the moon is fastened to the body representing the earth in machines made by man. The moon in nature is entirely detached from the sun, and the fact of her turning the same face to the earth does not at all form the machinery of her monthly revolution. Hence it is ascribed

to a separate motion, her monthly revolution on her axis. 2. The reference of the moon to the earth is arbitrary. The moon revolves about the earth, but she revolves about the sun also. She revolves about the sun more than about the earth; for when she is between the sun and the earth, her face is concave to the sun and convex to the earth's orbit. There are, in some respects, stronger reasons for regarding her as fastened to the sun than as fastened to the earth. But in truth she is not fastened at all; and the simplest way is to regard her as quite detached, and to consider her motion by which she turns her face different ways as quite separate from the motion by which she revolves about any centre. 3. The other celestial bodies also revolve about their axes, and especially the earth. All persons agree in thus expressing the fact in the case of the earth; and as there are 365 days in the year, the earth revolves 365 times on her axis with reference to the sun. By doing this she revolves 366 times on her axis with reference to the fixed stars. 4. It may easily be shown experimentally that mechanical force is requisite in order that a body revolving about another may always turn the same face to the other. The following is one way of doing this. Let a cup containing water be fastened at the extremity of an arm, o A, which revolves in a hori-



zontal plane about a centre, o. The cup will, of course, always turn the same side to the centre o, being forced to do so by the rigid connexion of the parts. But the water in the cup, not having any rigid connexion with the centre, will not turn the same side to the centre, o, during the revolution of the cup about o. This will appear if a straw be made to float upon the surface of the water; for the straw will always point in the same direction with regard to surrounding objects, (as shown at B, C, and D), and not with regard to o. If the motion is very rapid or long continued, a slight deviation of the straw from its original position will be produced by the friction of the water against the sides of the cup.

‘On Phenomena recently discovered in the Moon,’ by Mr. J. SYMONS.—The title given to this communication by the author was a misdescription of its contents, as it treated of no recent discoveries of phenomena in the moon, but was simply a renewal of his assertion, that it tended to mislead ordinary persons, and was unsuited to the instruction of the young, to describe the moon as moving round her own axis with a uniform rotatory motion once in each month. The author stated that a learned Judge, while recently trying an infringement of a patent, had stated that correct terminology as to the several kinds of motion was much required, and would greatly tend to prevent litigation in such cases as the one then under trial. And the author bore witness from his own experience to the serious mistakes which prevailed in the popular mind on this subject of describing the moon's motion as one combined of a motion round the earth in a month, and, at the same time, a uniform rotation on an axis passing through her centre once in the same time. The author claimed Dr. Whewell as a convert to his opinion, as he stated that he had taken down his words, in which he stated that this was only a conventional mode of describing her motion among many others that might with equal correctness be adopted rather than an exact statement of facts.—[Dr. WHEWELL:

No, no.]—The author reiterated that he had taken down his words, and proceeded to assert that the correct way of describing the motion in such a case as that of the moon was, when the body turned on an axis within herself, to speak of that as a motion round an axis; but when the motion was as in the present case, he maintained it to be round a line, not exactly passing through the earth, but near it: that would be the proper way to describe the motion. The author then produced a machine, consisting of a board, which he could turn round by machinery, and three wheels, which caused an upright arm, carrying a ball to represent the moon, either to revolve on the arm or to remain stationary as the ball went round the central one representing the earth. The upright arm, also carrying the moon, could be placed as a firm fixture to the revolving board, which caused it to revolve in a simple and obvious manner, always with the same face to the central ball representing the earth. This, the author asserted, truly represented the moon's motion, abstracting from a very slight, or insignificant, motion, called her libration in longitude.—[Every person in the Section capable of analyzing the motions produced by this machine saw that, when truly interpreted, these combined motions were at variance with the assertions of the author].—Towards the conclusion of his address, he stated, as a proof of how necessary it was to correct the statements in which philosophers sometimes indulged, that it was now asserted that there were not large assemblages of water upon the moon, whereas Newton had not only traced out her seas, but had actually calculated the heights of the lunar tides.—[At this palpable and gross misconception, several gentlemen on the platform could no longer contain themselves, but burst out into exclamations causing interruption].—The author then appealed for a fair hearing, stating that, but for the habit he had acquired at the bar of bearing these interruptions, he should be quite disconcerted by them: that, if he was right, he wished to maintain his opinion in a fair stand-up English fight; if wrong, he was willing, when fairly shown his error, to submit.

The Rev. Mr. PRITCHARD said that he was fully as much interested as the author in preserving the young from false teaching or from imbibing erroneous notions as the learned gentleman could be. And that, so completely did he dissent from all the learned gentleman had advanced, that almost in every instance in which he said "yes," he (Mr. Pritchard) would say "no," and where he said "no" he would say "yes." The gentleman asserted that the moon did not revolve uniformly on an axis within her once in a month: he maintained that she did. The gentleman asserted that the moon's librations were insignificant: he maintained, in opposition, that they were most important, and when correctly interpreted by one fitted by previous study for it, completely established the affirmative of the proposition which the learned gentleman denied. Mr. Pritchard acknowledged that he had been one of those who had caused interruption; but he excused himself to the Section by saying that it was hard for a person who had spent a lifetime in the study of a most delightful science to sit quiet and hear it murdered as the subject discussed to-day had been by a person entirely unacquainted with its simplest truths.—Mr. BROOKE, in the course of his observations on the controversy, said, he thought the views of Mr. Symons admitted of being disproved by many illustrations, but one appeared to him decisive. Mr. Brooke, stretching out his arm, placed a pen between his fingers so as to point with its sharp end to the ceiling. He then showed that, by revolving his entire arm once round, he could cause the point of the pen, in succession, to point to the right-hand wall, to the floor, to the left-hand wall, and, finally, to the ceiling, nearly as high as where it pointed when he began to revolve his arm; but, because he could not continue the revolution of his arm beyond that limit, he could carry the pointing of the pen no further round. He now moved his stretched-out hand round a vertical circle placed before him to represent the moon's orbit, and he showed that he could carry the pen any number of times round, if without any revolving of his arm, he merely moved

it round; but then the pen, instead of always pointing to the centre of the circle representing the earth, as the moon did, kept always fixedly pointing to one wall—say the right-hand one. But if, in endeavouring to imitate the moon always pointing the same face to the earth, he tried to do so with the pen, by revolving his arm, he could do so for one turn; but beyond that he could not continue to imitate the manner in which the moon kept the same face to the earth, because he could not continue the rotation of his arm, which was a correct representative of her axis. She does, therefore, revolve exactly once on her axis each month.—The PRESIDENT of the Section said that he was in the habit of illustrating the truth very simply. If you walked round a central point of a room so as to keep your face continually pointed to that centre as the moon does to the earth, you find that, as you go round, your face turns once to each of the four walls of the room in succession during the course going round. Now, if you diminish the radius of the circle in which you walk to nothing at the centre, where the orbital motion has disappeared, the motion on the axis alone remains.

Models to illustrate a new Method of teaching Perspective,' by Mr. H. R. TWINING.—The object of this communication is to explain the principles of perspective in such a manner as may enable those who draw to distribute their objects not only in a correct manner, but in one agreeable to the eye. It is an intermediary step between those rules which are demonstrated by diagrams in the usual treatises and those appearances which characterize natural objects themselves. The chief difficulty in enabling an audience to follow out the principles of perspective when applied to solid objects is, that every individual sees these from a different position; so that such an explanation of the effect observed as is adapted to one individual cannot suit another. Mr. Twining's method aims at overcoming this difficulty by placing an image (with which each individual is supposed to identify himself) in the exact spot which the observer ought to occupy, and which serves to mark the true focus of the picture.

"On an Instrument to illustrate Poinsot's Theory of Rotation," by Mr. J. C. MAXWELL.—In studying the rotation of a solid body according to Poinsot's method, we have to consider the successive positions of the instantaneous axis of rotation with reference both to directions fixed in space and axes assumed in the moving body. The path traced out by the pole of this axis on the *invariable plane* and on the *central ellipsoid* form interesting subjects of mathematical investigation. But, when we attempt to follow with our eye the motion of a rotating body, we find it difficult to determine through what point of the body the instantaneous axis passes at any time,—and to determine its path must be still more difficult. I have endeavoured to render visible the path of the instantaneous axis, and to vary the circumstances of motion, by means of a top of the same kind as that used by Mr. Elliott to illustrate precession. The body of the instrument is a hollow cone of wood, rising from a ring, seven inches in diameter and one inch thick. An iron axis, eight inches long, screws into the vertex of the cone. The lower extremity has a point of hard steel, which rests in an agate cup, and forms the support of the instrument. An iron nut, three ounces in weight, is made to screw on the axis, and to be fixed at any point; and in the wooden ring are screwed four bolts, of three ounces, working horizontally, and four bolts, of one ounce, working vertically. On the upper part of the axis is placed a disc of card, on which are drawn four concentric rings. Each ring is divided into four quadrants, which are coloured red, yellow, green, and blue. The spaces between the rings are white. When the top is in motion, it is easy to see in which quadrant the instantaneous axis is at any moment and the distance between it and the axis of the instrument; and we observe:—1st. That the instantaneous axis travels in a closed curve, and returns to its original position in the body. 2nd. That, by working the vertical bolts, we can make the axis of the instrument the centre of this closed curve. It will then be one of the principal axes of

inertia. 3rd. That, by working the nut on the axis, we can make the order of colours either red, yellow, green, blue, or the reverse. When the order of colours is in the *same* direction as the rotation, it indicates that the axis of the instrument is that of *greatest* moment of inertia. 4th. That, if we screw the two pairs of opposite horizontal bolts to different distances from the axis, the path of the instantaneous pole will no longer be equidistant from the axis, but will describe an ellipse, whose longer axis is in the direction of the *mean axis* of the instrument. 5th. That, if we now make one of the two horizontal axes less and the other greater than the vertical axis, the instantaneous pole will separate from the axis of the instrument, and the axis will incline more and more till the spinning can no longer go on, on account of the obliquity. It is easy to see that, by attending to the laws of motion, we may produce any of the above effects at pleasure, and illustrate many different propositions by means of the same instrument.

Mr. BOOTH said that the beautiful theory of rotation discovered by the French analysts, and so beautifully given in a condensed memoir by Poinsot, was too universally known to need any explanation. But he was sure that none of the authors of this theory ever anticipated the day when an instrument so simple as the one now exhibited could be produced capable of demonstrating to the eye palpably the most intricate and difficult to be explained of these motions; particularly that of the instantaneous axis of rotation. Mr. Booth then explained that in the case in which this instrument would have run into the room if not caught, the path of the pole of that axis, was shown by the theory to be a very elongated elliptic curve. He also pointed out how the theory gave the path of this pole in other cases, and how exactly the instrument illustrated it.

"On the Physical Structure of the Earth," by Prof. HENNESSY.—After some preliminary observations as to the impossibility of accounting for the earth's figure, without supposing it to have been once a fused mass, the exterior of which has cooled into a solid crust, the process of solidification of the fluid was described. The influence of the connexion and circulation of the particles in a heterogeneous fluid was shown to be different from what would take place in a homogeneous fluid such as usually comes under our notice. As the primitive fluid mass of the earth would consist of strata increasing in density from the surface towards the centre, its refrigeration would be that of a heterogeneous fluid, and the process of circulation would be less energetic in going from its surface towards its centre. Thus, the earth would ultimately consist of a fluid nucleus inclosed in a spheroidal shell. The increase in thickness of this shell would take place by the solidification of each of the surface strata of the nucleus in succession. If the matter composing the interior of the earth is subjected to the same physical laws as the material of the solid crust coming under our notice, the change of state in the fluid must be accompanied by a diminution of its volume. The contrary hypothesis had been hitherto always assumed in mathematical investigations relative to the form and structure of the earth. The erroneous supposition that the particles of the primitive fluid retained the same positions after the mass had advanced in the process of solidification as they had before the process commenced, had been tacitly or openly assumed in all such inquiries until it was formally rejected by the author, who proposed to assume for the fluid similar properties to those exhibited by the fusion and solidification of such portions of the solidified crust as are accessible to observation. The results to which the improved hypothesis has led show that it fundamentally affects the whole question, not only of the shape and internal structure of the earth, but also of the various actions and reactions taking place between the fluid nucleus and the solid shell. If the process of solidification took place without change of volume in the congelation of the fluid, the strata of the shell would possess the same forms as those of the primitive fluid, and their oblateness would diminish in going from the outer to the inner surface. If the fluid contracts

in volume on passing to the solid state, the remaining fluid will tend to assume a more and more oblate figure after the formation of each stratum of the shell. The law of density of the nucleus will not be the same as that of the primitive fluid, but will vary more slowly, and the mass will thus tend towards a state of homogeneity as the radius of the nucleus diminishes by the gradual thickening of the shell. The surface of the nucleus, and consequently the inner surface of the shell, will thus tend to become more oblate after each successive stratum added to the shell by congelation from the nucleus. This result, combined with another obtained by Mr. Hopkins, proves that so great pressure and friction exist at the surface of contact of the shell and nucleus as to cause both to rotate together nearly as one solid mass. Other grounds for believing in the existence of the great pressure exercised by the nucleus at the surface of the shell were adduced. If the density of the fluid strata were due to the pressures they support, and if the earth solidified without any change of state in the solidifying fluid, the pressure against the inner surface of the shell would be that due to the density of the surface stratum of the nucleus, and would, therefore, rapidly increase with the thickness of the shell. Contraction in volume of the fluid on entering the solid state would diminish this pressure, but yet it may continue to be very considerable, as the co-efficient of contraction would always approach towards unity. The phenomena of the solidification of lava and of volcanic bombs were referred to in illustration of these views, and their application was then shown to some of the greatest questions of geology. The relations of symmetry which the researches of M. Elie de Beaumont seem to establish between the great lines of elevation which traverse the surface of the earth appear to Prof. Hennessy far more simply and satisfactorily explained by the expansive tendency of the nucleus which produces the great pressure against the shell than by the collapse and subsidence of the latter. The direction of the forces which would tend to produce a rupture from the purely elevatory action of the pressure referred to would be far more favourable to symmetry than if the shell were undergoing a distortion of shape from collapsing inwards. The nearly spherical shape of the shell would also greatly increase its resistance to forces acting perpendicularly to its surface, so as to cause it to subside, while the action of elevatory forces would not be resisted in the same manner.

'On the Congruence $nx \equiv n+1 \pmod{p}$,¹' by J. T. GRAVES.—The author said, it was well known to those who have studied foreign works on the Theory of Numbers, that the expression $a \equiv b \pmod{c}$ denotes that $a - b$, divided by c , is a whole number. When this relation has place, a and b are said to be congruent with respect to the modulus c , and the relation itself is called a congruence. Mr. Graves shows from elementary principles of the theory of numbers that in the congruence $nx \equiv n+1 \pmod{p}$, if p be a prime number, and if n be made to assume in regular ascending order all values, from 1 to $p-1$ inclusive, x will be found to have, in some order or other, all values from 2 to p inclusive. He then gave examples, and showed the use to be made of this property. In introducing the subject, the author took occasion to point out that the late Mr. Peter Barlow's valuable work on the Theory of Numbers, published in 1811, which is the only elementary text-book of note in our language especially directed to that subject, is not sufficient for the requirements of a modern English student.

Mr. BAUDIN, from private information, gave the meeting reason to hope that this desideratum in English mathematical literature would ere long be satisfactorily supplied.

MONDAY.—*On a New Form of Cast-Iron Galvanic Battery*, by Mr. W. SYKES.—The author exhibited a very simple wooden frame for holding the plates of zinc and of cast iron, which were cast on the same pattern. In this frame he had two samples of the mode of arranging the plates which might be adopted: one, in which each zinc plate had an iron plate on each side of it, as in Wollaston's battery;

the plates arranged in this form could be set at such distances by pieces of wood and a simple binding screw that each galvanic pair, as the three may be termed, can sit in the cell of a Wollaston earthenware trough. In the other arrangement, one to act on the principle of Grove's battery may be produced without the use of porous cells by placing the plates alternately, as described in the second volume of 'Walker and Lardner's Treatise on Electricity' in 'Lardner's Cyclopaedia.' This combination the author affirmed to be cheap, convenient, and very energetic.

Observations with the Aneroid Metallique and Thermometer during a Tour through Palestine and along the Shores of the Dead Sea, by Mr. H. POOLE.—During a recent tour through Palestine I carried an aneroid metallique, and though I would not presume to say that the results of observations made with it are quite correct, yet as the readings in many instances are close approximations to the calculations of Lynch and other travellers, I wish to draw attention to that instrument as affording an easy mode of obtaining approximate levelings of heights in unsurveyed countries. It is light, and can be easily carried by a strap over the shoulder. From the rock-work being visible a re-adjustment can be easily made when required upon ascending high mountains. A table of corrections is, however, required, and which I found must be *additive* with an *increase* of temperature (being the reverse of mercurial barometers and vacuum aneroids), as indicated by the variation in the readings at different temperatures at the same localities, as recorded in the accompanying table. In Dent's Tables 85 feet are calculated for the difference of each tenth of an inch of barometer: this multiplied by 33.37 inches, equal to a mètre, gives 33.46 feet, or 33.50 feet in common practice, as the multiple of each division in the aneroid metallique. In practice I found it very nearly correct:—for instance, there are 47 steps with a six-inch rise going down into the Tomb of the Virgin Mary in the Valley of Jehoshaphat, 23.5 feet; and by aneroid I read a difference of 7 millimètres \times 33.5 = 23.45 feet. Again, the minaret of the Church of Ascension on the top of the Mount of Olives measured 36.5 feet,—by aneroid the difference was 11 millimètres \times 33.5 = 36.85 feet. If the aneroid were mounted with a vernier scale, the observations could be more closely read off. I particularly mention these comparisons of the aneroid with actual measurement, as they gave me confidence in it at the time, and also because I found on my return to London that I had arrived very nearly to the same results as Lieut. Lynch up to 2,000 feet above the level of the Mediterranean Sea, and also in the depression of the Dead Sea 1313.5 feet by aneroid, while Lynch made it 1316.7 feet by level, and Capt. Symonds calls it 1312 feet. There is also a variation in the line of level of the Dead Sea at different seasons of the year, for I found at Ras El Burghik three distinct lines of drift wood, one above the other,—opposite to Usdum the line of salt incrustations was 40 yards and the line of drift 70 yards distant from the edge of the sea, while along the west side of the peninsula "El Lisan" a reef of rocks was exposed about a quarter of a mile distant from the shore, which does not appear to have been noticed by Lieut. Lynch's party,—I therefore think I must have been there when the water was unusually low. I found the temperature of the Dead Sea at the north end 82° Fahr. at 5 A.M., and 83° at the south end at 4 P.M. River Jordan and brooks on the Lisan and at the Ghor 61° each; brine spring 90°, where the small fish "Lebia" was caught close to the edge of the Dead Sea; Wady El Burghik, temperature of water 76°, spring at Engedi 83°. At Ain Terabéh the sea was 80°, also a brine spring close to the shore, and the freshwater spring was 79°,—in the latter were a number of Lebia swimming about, the largest appearing to be about 3 inches long. A sulphurous smell was observed on passing the white hills south of Sebbeh, near Wady El Mahras, at Birket el Khalil,—but not at other places. It often blew hard during the day, but the waves never appeared to be more than 2 feet high, and the sea quickly went down after the wind ceased. Several nights were quite calm, but I never ob-

served any phosphorescence on the water. The table of the dry and wet bulb thermometer was made by the same instrument, as unfortunately I had broken two others, and there were not any to be procured in Jerusalem. I therefore obtained the lower, or wet-bulb, temperature by wetting the bulb and waving the instrument in the shade, not having any muslin to cover it with. The relative humidity by this rough means was from 50 to 25 per cent. on the shore of the Dead Sea. The force of vapour being between 6 and 3 inches by Regnault's formula. The vapour arising from the Dead Sea, when looked at from the heights of Ain jedi (Engedi) and Ghomran, had the same appearance as the fumes produced at brass castings.

Continuation of Meteorological Observations for 1855, at Huggate, Yorkshire, by the Rev. H. RANKIN.—The atmospheric wave was twelve days in passing; coldest day, 13th, February 18; hottest day, 73°, July 13; lowest point of the barometer, 28.160, March 3; highest point, 30.460; rain, 23.760 inches; eclipse of the sun visible only a few seconds; in the evening a large meteor exploded and discharged coloured scintillations like a rocket. On the evening of October 21 the whole atmosphere had the appearance of the hull of a ship, with the white planks all distinct from stem to stern. The ends were N.W. and S.E. The N.W. end was like pieces of amber, and the S.E. end a beautiful purple. The common observation of the oldest labourers is, that when the wind blows across the ends of the ship, heavy rain will soon come. In the present case, the wind blew obliquely across the ends, so, according to the common prognostic, we soon had a heavy fall of rain. Winds: E., 11 days; W., 36 days; N., 5 days; N.E., 39 days; N.W., 30 days; S.E., 6 days; S.W., 25 days. Weather: clear days, 117; rain, 51; frost, 28; white frost, 29; snow, 18; mist, 7; fog, 4; thunder, 8 days.

'On Negretti & Zambra's Patent Mercurial Minimum Thermometer,' by Dr. LEE.—Dr. Lee exhibited the thermometer to the Section, and pointed out the advantages of a thermometer of mercury in preference to alcohol, which is subject to unequal expansion at different degrees of heat; and it is a desideratum that all thermometers in a meteorological observatory should be constructed with one fluid, and that fluid the recognized standard of heat. The thermometer has been tried at the Observatory of Greenwich, and by Mr. Glaisher, the Secretary of the British Meteorological Society, E. J. LOWE, Esq., of the Beeston Observatory, Mr. Drew, and several other eminent meteorologists; and some instances have occurred in which errors in the alcohol minimum thermometer have been corrected by the observations made by the patent mercurial minimum thermometer.

Some highly-interesting 'Meteorological Tables on the Climate of Torquay and South Devon, contrasted with those from other places in the Reports of the Registrar-General,' were communicated by Mr. E. VIVIAN,—of which the following is a general summary:—

	Torquay.	England.
Annual mean temperature	50°.3	48°.3
Maximum temperature	76°	83°
Minimum temperature	27°	15°
Mean daily range	9°.9	14°.5
Quarterly range	13°	46°
Days of rain	155	170
Inches of rain	27.8	25.5
Grains of vapour in a cubic foot of air	3.4	3.4
Ditto required to saturate ditto	0.9	0.7
Mean humidity	0.76	0.82

—The cool summers of South Devon and its mild winters were shown to arise from the equable temperature of the sea, which had been observed as much as 21° degrees above the minimum, and 13° below the maximum, of the air. The humidity of the air in summer was also shown to be diminished by the same cause, the temperature of the sea being frequently below the dew-point of the air, thus acting as a condenser, and producing results exactly the reverse of the relaxing character assigned to that district by medical and other writers on insufficient data.

Mr. VIVIAN then exhibited to the Section a set of his newly-invented meteorological instruments.

In the course of the conversation upon this communication, Mr. Pritchard stated that the

importance of some of these instruments would be apparent to the Section, from a fact that he should mention. He had found that, notwithstanding the utmost solicitude and care, he was constantly losing the most valuable exotics, especially foreign ferns, for which he had to pay heavy prices. Remedy after remedy was tried in vain, still they perished. At length, happening to observe, one sultry day, that the wet and dry bulb thermometers indicated an enormous difference of temperature, upon looking around for the cause, he found that his gardener, a skilful man, too, was in the habit, on very hot days, to let out, as he expressed it, and moderate the heat by opening some upper sashes. It instantly occurred to him that this was much more letting out the light vapour which these plants so essentially required for health. He directed those sashes to be closed. In a very few minutes the indications of the wet and dry bulb thermometers approached within two or three degrees of each other; and he observed with delight that his drooping exotics began to revive. From that day they were saved. He lost no more, and now his gardener was as attentive to the indications of the dry and wet bulb thermometers as any philosopher of the British Association.

'On an Instrument for observing Vertical Currents in the Atmosphere,' by Prof. HENNESSY.—The author said he had been led to devise this instrument when offering an explanation, printed in the *Proceedings of the Royal Irish Academy*, of certain abnormal phenomena sometimes observed on the surface of Lough Erne. The instrument is constructed like a common wind-vane, but instead of the fixed tail, a circular disc is placed vertically on an axis passing through the branches of a fork at the tail end. This disc is pierced about half-way between its centre and circumference so as to admit another axle, to the ends of which are firmly attached two light rectangular discs. These discs are always in a horizontal position, whatever may be the position of the circular disc, for each of them has a pendulum attached to its centre by which the centre of gravity is kept considerably below the axle. These discs, therefore, cannot be acted on by a wind which blows horizontally. The position of the circular disc will thus very clearly show whether any given current has an upward or a downward tendency. The application of this instrument to the study of mountain winds was pointed out, as well as to assist in studying some of the undulatory movements of the atmosphere. In the trials which have been already made with it, Prof. Hennessy stated that it gave satisfactory results. The instrument is, of course, not an anemometer, but simply a kind of universal anemoscope, for it shows both the horizontal and vertical directions of a current.

'On a remarkable Hail-Storm in North Staffordshire,' with some Casts of the Hailstones, by Mr. R. GARNER.—This storm, which came from the N.W. in the afternoon of the 22nd of July last, between four and five o'clock, continued with great violence for about half-an-hour,—some of the masses of ice which fell being 1½ inch in diameter, and of course doing corresponding injury, for instance, breaking more than twenty large squares of glass in the rather small house of his (the writer's) next-door neighbour, and those of his own Wardian case. Most of the hailstones seemed to have nodulated nuclei, containing numerous particles of air, and externally to these were formed irregular conglomerations of ice, looking like a mass of imperfect but transparent crystals. The storm was attended with gusts of wind and thunder, and was of a very limited and defined extent; but to the south of the writer's residence, about four miles away, near the Barlaston Station, a violent wind from an opposite direction, S.W. or S.S.W., occurred at the same hour, without rain or hail, the ravages of which could afterwards be traced for a length of two miles, with a breadth of only from 50 to 100 yards. Oaks were deprived by it of their largest limbs, poplars broken at the height of 8 or 12 feet from the ground, and an alder, 50 feet high, was uprooted and carried some distance. The clouds were extremely dark for a great extent of country. An artist took some casts of such hailstones as he picked up, by no means the largest. These the

writer begs leave to exhibit, with a drawing; and as the casts are curious, their exhibition will perhaps form an apology for the writer's unwonted attempt at meteorology.

The SECRETARY handed round the plaster casts of the hailstones, which, from their great size, attracted much attention.—Prof. STEVELLY stated that since the commencement of the sittings of the British Association he had received a letter from a much-valued friend, Prof. Wyville Thomson, of Belfast, inquiring of another friend, who had resided long in Ceylon, why it was that in the most sultry weather, which in that climate took place at particular times of the moon's age, the largest and most destructive hail—rather, masses of ice—fell during the violent thunder-storms which then prevailed. He (Prof. Stevelly) believed it to arise from the fact that the large body of rain discharged from above during the first electrical discharge, by leaving a rarefied stratum of air behind, so cooled that stratum as that the succeeding discharges of thunder and lightning—which frequently, by the alternations of electric states by induction between the same clouds, went on to twenty or thirty successive discharges—produced frozen masses at first more in the open state of snow, but as they descended were cold enough to freeze the cloud particles and vapour, which they accumulated upon their surfaces into clear ice.

'On a Model of a Self-Registering Anemometer, designed and constructed by Mr. R. Beckley, of Kew Observatory,' described by Mr. WELSH.—In this model Mr. Beckley has adopted Dr. Robinson's method of measuring the velocity of the wind by the rotation of a system of hemispherical cups, the direction being indicated by a double wheel-fan like the directing vane at the back of a windmill. A stout tubular support carries the whole of the external part of the instrument, including the measure of velocity, the direction vane, and a rain-gauge. This support is so made that it can be easily adapted to the roof of any building upon which it may be necessary to mount it. All the rotatory parts of the anemometer run upon friction balls. The shaft of the apparatus for measuring the movement of the wind, by means of a diminishing train of wheels, is made to turn a cylinder upon which is wrapped a sheet of paper of the kind used for "metallic memorandum books," this paper having the property of receiving a trace from a style of brass. The sheet of paper is divided into two sections, upon one of which is recorded the motion of the wind and upon the other the direction. As the cylinder is being turned by the action of the wind a clock carries a pencil along the cylinder at a uniform rate of 12 inches in the 24 hours. To the lower end of the direction shaft is attached a spiral of such a figure that equal angles correspond to equal increments of radius; the edge of this spiral consists of a thin slip of brass, which touches the paper and records the direction of the wind on a rectilinear scale. When the sheet of paper is unwrapped from the cylinder after 24 hours, the motion of the wind and the direction are both found projected in rectangular co-ordinates. The author also stated that as it was well known to be difficult, if not impossible, by any method at present in use to judge of the true direction of the wind when in a ship moving swiftly at sea, the method suggested in the following extract of a letter will be found effectual:—"By means of a portable Robinson's anemometer, provided with a means of observing the total number of turns made by the rotating part in any given time, observe the apparent velocity of the wind and record it in knots per hour. By an anemoscope of any kind register the apparent direction of the wind. From the log-book take the rate and direction of the ship's motion. On a slate or other similar surface scratch a permanent compass circle. Set off from the centre of the circle, or the radius of the direction of the ship's head, by any convenient scale, the number of knots per hour the ship is going—from this point draw a pencil line parallel to the direction of the wind as observed by the anemoscope (i.e., the apparent direction to which the wind is going)—set off on this line the number of knots per hour as shown by the anemometer—draw a line from the centre of the circle to this last point. The

length of this line by the scale adopted gives the true velocity of the wind, and its direction (carried backwards) shows the point from which the wind is coming. A parallel ruler divided on the edge is all that is required besides the slate. It would be easy enough to contrive some mechanism to save the trouble of drawing lines, but it would not, I believe, be any real simplification, and would increase the expense. The train of indicating wheels might be so arranged that they at once indicate knots per hour without reference to tables, and can be readily set to zero for a fresh observation."

'Instructions for the Graduation of Boiling-Point Thermometers, intended for the Measurement of Heights,' by Mr. WELSH.—Let the thermometer be in the first instance filled with a sufficient quantity of mercury to allow the point 82° Fahr. to be where the point 212° is desired ultimately to be. Let a chamber be made at the top of the tube about three inches above the point 212°,—or, if the thermometer is required to have a chamber at the top when finally completed, let there be two chambers made with sufficient space between them to allow of the tube being there sealed by a blow-pipe flame. By comparison with a standard thermometer, set off the points 82, 72, 62, 52, 42°, (but not 32°). The scale may then be divided, adopting the mark, 82 as corresponding to 212°; 72 to 201° 87'; 62 to 191° 74'; 52 to 181° 61'; 42 to 171° 48'. The graduation of the scale should then be verified by comparison with a standard thermometer at different points from 37° to 87° Fahr., and a table of errors of graduation thus obtained. A sufficient quantity of mercury must now be separated from the main mass until the top of the column stands in boiling water at the proper reading. The superfluous mercury having been lodged in the upper chamber may be removed by sealing up the tube between the two chambers. If it is not possible to detach exactly the proper quantity of mercury to make the column stand at the true temperature of boiling water, the difference should be added as a further constant correction to the table already found by comparison with the standard. The following determination of the corrections to a thermometer, constructed on this principle by Messrs. Negretti & Zambra, will serve as an example of the accuracy which may be attained by this method.—

Reading of Standard.	Reading of Boiling-Point Thermometer.		Standard Reading after Withdrawal of Mercury.	Final Correction.
	Observed.	Including Final Error at 212.		
42°00	171°76	171°61	171°48	-13
47°00	176°80	176°65	176°54	-11
52°00	181°83	181°70	181°61	-09
57°00	186°99	186°84	186°67	-17
62°00	191°97	191°82	191°74	-08
67°00	196°98	196°83	196°60	-03
72°00	202°08	201°93	201°67	-06
77°00	207°19	207°04	207°94	-10
82°00	212°29	212°14	212°00	-14

'On a Thermometer for Measuring Fluctuations of Temperature,' by B. STEWART; communicated and described by Mr. WELSH.—If a bulb be blown between two thermometric glass tubes of unequal bores, and the instrument be filled with mercury in the same manner as an ordinary thermometer, and laid horizontal or nearly so, it will be found that contractions from cold take place only in the narrow bore, and expansions from heat only in the wide one. The reason of this seems to be, that while the temperature remains the same the mercury is kept at rest, and prevented from retreating from the small bore into the bulb, by friction; but, when a motive force is supplied by a change of temperature, the motion of the mercury takes place in that direction in which it is most aided by capillary action. It was suggested by Mr. Welsh to the author that such an instrument might be used to measure fluctuations of temperature. And the author thinks it might be applied to measure with exactness the power of a source of radiant heat; for, by alternately interposing a screen between this instrument and the source of heat, and withdrawing the same screen, the effect

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of the screen on the thermometer would be observed. The author has not yet had time to make any experiments on this subject, but it is evident that the instrument would be of great service in the study of atmospheric fluctuations.

'On the Interpretation of Thermometric Observations,' by T. DODD.—The author has observed that the cause of the variations of temperature in the atmosphere is not to be attributed to the variation of the temperature of the air, but to the variation of the temperature of the sun, and that the variation of the temperature of the sun is not to be attributed to the variation of the temperature of the earth, but to the variation of the temperature of the sun.

of the source on the mercury would be multiplied by the number of times this operation was performed. In constructing such an instrument care must be taken that the tubes used are quite free from dirt or moisture, and, that they are not bent, but form one straight line, the bulb being in the middle, and swelling out symmetrically from both its extremities. The best proportion between the capacities of the bores is perhaps about 1 to 4, and the best arrangement of bores seems to be one suggested by Mr. Welsh, viz., a round bore for the wide tube, and a flat or elliptical bore for the narrow one, the greatest diameter of which equals the diameter of the wide bore. In graduating, if, when the instrument is vertical, the narrow bore being beneath, the mercury fills the bulb and rises in the wide bore, then the wide bore may be pointed off at different temperatures like an ordinary thermometer; but if under these circumstances the mercury does not rise in the wide bore, then, in order to point off the wide bore, the instrument must be laid horizontally in a dish of water, and compared with a standard thermometer at different temperatures; the extremity of the mercury in the narrow bore being always kept at a fixed point. When the wide bore has been pointed off we may, by running the mercury along, find what length of the narrow bore corresponds to a certain length of the wide one, and thus be enabled to point off the narrow bore. In using the instrument it should be kept nearly horizontal, and there is probably for each instrument a small range of inclination, for every position within which its peculiar action holds, but beyond which it is interfered with by gravity. Before graduating such an instrument it should be ascertained whether it is likely to answer, and the best test seems to be to lay it horizontal, exposing it to changes of temperature of the same nature with those which it is intended afterwards to measure;—if its action be perfect, the mercury will eventually be found to have retreated into the bulb from the narrow bore; but, should it have stopped at any point, the action will only be perfect up to that point. If this demands too much time, it may be tested by repeatedly applying to the bulb of an instrument so placed a few drops of slightly warmed water.

'On Barometrical and Thermometrical Observations at Scarborough,' by Capt. WOODALL.—The author regretted that the reduction and tabulation of these observations had not yet been completed, but if the Committee would permit the title of the paper to stand in the Proceedings, they would be ready long before the printing of the volume of the Reports. He took this opportunity of stating in reply to a question asked in the section by Prof. HENNESSY, that at Scarborough the fluctuation of the temperature of the sea was extremely small, its mean variation for the year only amounting to about 9° . It attained its maximum 56° pretty regularly about the middle or latter end of October. While its minimum, caused no doubt by the melting of the snows on the mountains of Norway, was as regularly attained about the latter end of March, and amounted to about 47° .

'On the Balaklava Tempest, and the Mode of Interpreting Barometrical Fluctuations,' by Mr. T. DOBSON.—In the month of November, 1854, the passage of a storm over the British islands caused a considerable depression of the barometric column, beginning on the 11th of November and ending on the 19th, as shown by the barometric curves which accompany this paper. During four consecutive days of this period of diminished atmospheric pressure, there occurred in the coal mines of Britain, five fatal explosions, at the following places:—on Nov. 13, at Old Park Colliery, Dudley, Worcestershire; Nov. 14, Cramlington Colliery, Northumberland; Nov. 15, Bennet's Colliery, Bolton, Lancashire, and Birchen Coppice Colliery, Dudley; Nov. 16, Rosehill Colliery, Coalbridge, N.B. These facts alone render this storm worthy of especial attention, independently of the notoriety which it has acquired from its disastrous effects on the allied fleets and armies in the Crimea. The meteorological circumstances which characterized the Balaklava tempest have been determined with unusual care and skill, from a very great number of observations

at stations spread over the whole surface of Europe, by M. Liais, of the Imperial Observatory at Paris. In all probability, many years will elapse before a great storm on land is subjected to an examination so rigorous and complete as that undertaken by M. Liais in the present instance. This storm may, therefore, be adopted as the most satisfactory test that we are likely to have for some time to come of the correctness of the principles of interpretation which I have already applied to barometric fluctuations in my report on the relation between explosions in coal mines and revolving storms,—principles which flow directly from the nature of cyclones. For the observations with which I have constructed the barometrical curves

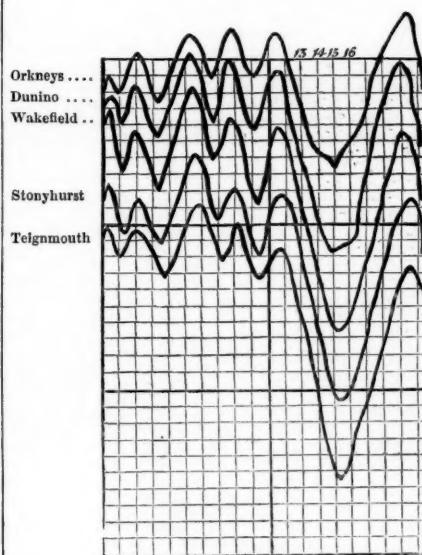
would be that the chord (S.E., E., N.E.) passed over the British islands, and the chord (S.W., W., N.W.)

in the second case, (B). Such deductions are both obvious and satisfactory to persons whose knowledge of nautical technicalities has enabled them to appreciate the de-

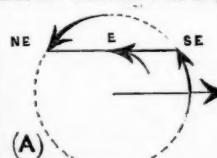
demonstrations of the rotatory and progressive motions of Atlantic cyclones, given by Redfield, Reid, &c. M. Liais having favoured me with an opportunity of studying his unpublished charts of the Balaklava tempest, I have found therein a distinct and impressive confirmation of the correctness of the method of interpreting barometric fluctuations according to the laws of cyclonology. These charts fully establish the truth of the inferences derived above from the contemporaneous barometric curves in Britain. They prove that the Balaklava tempest was a cyclone, moving to the eastward, along a central track which passed to the southward of Britain. It is known that during their transit from the Gulf of Mexico to the western coasts of Europe, across the comparatively uniform surface of the ocean, cyclones preserve an approximately circular form. The excellent charts of M. Liais, at the same time that they exhibit the progress of the storm day by day, from the shores of Britain across the continent of Europe, to the Caucasian mountains and the borders of the Caspian Sea, show also the remarkable modifications produced in the normal condition of the cyclone by mountains and other irregularities of the surface of the land. Thus, for example, a portion of the cyclone is delayed nearly twenty-four hours in passing the Alps. The consequence of this and similar obstructions is, that what was nearly a circular atmospheric wave while crossing the ocean, takes the form of a much elongated and somewhat distorted ellipse on land, enveloping an elliptical central area of maximum barometric depression, which extends, on one chart, from Dantzig in the Baltic to Varna in the Black Sea. Around this central space the wind still blows continuously in the direction peculiar to the cyclones of the northern hemisphere. In the case, therefore, of the Balaklava tempest, whose nature has been determined with much greater exactness than that of any other tempest on land, we have unequivocal testimony that the principles of cyclonology may be safely applied to interpret the fluctuations of the barometer in Great Britain.

'On the Causes of great Inundations,' by Mr. T. DOBSON.—The author stated that the principal special causes tending to produce great inundations in a country are the inclination and the lithological character of the surface of the basins drained by the rivers of the country. Where the subsoil of a river basin is composed chiefly of porous, and, therefore, permeable materials, as colite, loose gravel, &c., the rain will be absorbed almost as fast as it falls, and will reach the river gradually, after returning to the surface, through springs. But where the subsoil is generally compact and impermeable, as clay, granite, &c., the rain will flow over the surface with more or less velocity, according to the greater or less inclination of the surface to the horizon. So far, therefore, as the geological character of a river basin is concerned, the tendency to inundation due to that basin will be measured by the difference between the areas of the permeable and of the impermeable superficial strata and by the inclination of the sides of the basin to the horizon. The general cause of great inundations in the countries forming the western seaboard of Europe is the eastward progressive motion of the cyclones, or revolving storms, of the North Atlantic Ocean. Starting from the Caribbean Sea and the Gulf of Mexico, and sweeping during a considerable portion of their early course along the warm surface of the gulf-stream, they collect the vapours so copiously generated in southern lati-

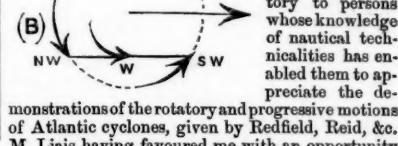
November, 1854.



for November, 1854, at Teignmouth in Devonshire, Stonyhurst in Lancashire, Wakefield in Yorkshire, and Dunino in Scotland, I am indebted to Mr. Glashier, the able Secretary of the British Meteorological Society. The curve for the Orkney Islands is from observations published in the *Philosophical Magazine*. At Wakefield and Stonyhurst observations are made four times a day, at the other stations twice a day. The cyclonic interpretation in this case would be—First, that the curves indicate the passage of a cyclone, of which the centre passed to the southward of England. This is inferred from the gradual increase of the barometric depression from the Orkneys in the north to Teignmouth in the south, and depends on the fact that the height of the mercurial column decreases continuously from the circumference to the centre of a cyclone. This inference is confirmed by the observation that the wind blew from the eastward at all the stations. Second, that the cyclone was progressing to the eastward. This is derived from observing that, at each station the wind began at S.E. while the mercury was falling, veered to E. when the mercury was lowest, and then to N.E. as the mercury rose. If the wind had veered from S.W. through W. to N.W., as it does most frequently in British storms, and the barometric depressions had increased from Teignmouth towards the Orkneys, the interpretation would have been, that the depression was caused by a cyclone travelling eastward, of which the central track lay to the north of Scotland. In the first case, (A), the explanation



(A)



of the cyclone is that the chord (S.E., E., N.E.) passed over the British islands, and the chord (S.W., W., N.W.)

tudes, and, finally, precipitate them on the high lands and mountain chains of Europe. In general, several cyclones follow each other in rapid succession; so that the continued series at length saturate the earth, and floods and inundations ensue. The author then proceeded in a most interesting meteorological history of the great inundations in France, in October, 1844, October, 1846, and in May and June of the present year, to illustrate these remarks on the general principles which explain the causes of the great inundations of Western Europe.

'On new Method of making Maximum Self-Registering Thermometers,' by Prof. PHILLIPS.— Thermometers constructed after this plan were first exhibited by Prof. Phillips, accompanied by a description, to the Oxford Meeting of the Association in 1832. In consequence of a careful examination of the principle on which they were arranged by Mr. Welsh, attention was again called to the subject. The principle of the instrument is the employment of a little portion of the column of mercury, detached as a *marker*. This is capable of a great range of adaptation, and is independent of change, by time or chemical action, and as delicate in operation and as free from error as the best ordinary thermometer can be made. Mr. Welsh constructed some in a manner much superior to that formerly employed by Prof. Phillips, and reported in very favourable terms on the accuracy and permanency of the instrument. Thus encouraged, Mr. Casella had undertaken to adapt the thermometer to different purposes in meteorology and philosophical research, but without changing in any degree the essential character of the instrument. Among the examples on the table was one which was planned by Prof. Phillips for special researches on limited sources, or areas, of heat, with small bulb, fine bore, and *short detached marking column*. Thus made, the thermometer may be used in any position, vertical inclined, or horizontal, and the *short detached marking column* will retain its place with such firmness that instruments may even be carried far or agitated much without losing the registration.

SATURDAY.

SECTION C.—GEOLOGY.

‘On some New Species of Corals in the Lias of Gloucestershire, Worcestershire and Warwickshire,’ by the Rev. P. B. BRODIE.—The author stated that the object of this communication was rather to indicate the occurrence of some new and undescribed species of corals in the lias, than to describe them in detail. He remarked that they were generally rare in the lias, the sea in which it was deposited having been unfavourable to the growth of Polyparia. A species of *Cyathophyllum* and a *flustra* have been found by Mr. C. Moore in the Upper Lias of Ilminster, in Somersetshire, in addition to those figured in the ‘Mémoirs’ of the Palaeontographical Society. From the Lias Marlstone of Northamptonshire a form belonging probably to the *Furgidae*, in the collection of the late Hugh Strickland, Esq., was referred to. Several specimens of the genus *Montlivaltia* have been discovered in the shales of the Lower Lias, both in Gloucestershire and Oxfordshire, by the author, and were described by him. A coral, which appeared to be a species of *Turbiscolia*, occurred in the Lower Lias near Cheltenham. In Gloucestershire a few species of *Isastrea* have been met with, and in one case in sufficient numbers to show the existence of an ancient coral reef: most of them are highly solidified, but in others the cells are soft and crumbly, a condition very different to that of most of the Liassic *Isastrea*. The author referred to a group of corals belonging to this genus in the Lias of the Isle of Skye.

'On a New Species of Pollicipes in the Inferior Oolite near Stroud, in Gloucestershire,' by the Rev. P. B. BRODIE.—The author observed, that the Lepididae were rare in a fossil state, and this was presumed to be a distinct species from the *Pollicipes politicus* in the Stonefield Slate. A small valve of another, and probably a distinct species, has been found in the Lias by Mr. Govey, the oldest remains of a Cirripede yet detected.

On the Relative Distribution of Land and

Water as affecting Climate at different Geological Epochs,' by Prof. HENNESSY.

ON THE GREAT PTERYGOTUS (SERAPHIM) OF SCOTLAND, AND OTHER SPECIES.

On the Great *Pterygotus* (Seraphim) of Scotland, and other Species, by Mr. J. W. SALTER.—This paper was in some measure a continuation of one published in the *Quarterly Geological Journal* for 1855, describing some new and large crustacean forms from the uppermost Silurian rocks of the south of Scotland. They were described under the name of *Himanthopterus*, and were supposed to differ from the published fragments of the great *Pterygotus* by the lateral position of the large simple eyes. In the general shape of the body, however, the terminal joints and tail, in the want of appendages to the abdomen, as well as in the form and number of the swimming feet, mandibles, maxilles and antennae, there was found to be no further examination the closest resemblance between *Himanthopterus* and the great *Pterygotus*. And the resemblance has been carried still further by the favourable collocation of all the known specimens from the Scotch collections which have furnished us with nearly all the portions, and also with the head, which we now find to be exactly like that of *Himanthopterus*, and to have *lateral*, not *subcentral*, eyes, as represented by other authors. The two genera are therefore identical, and the group, as now constituted, includes a number both of small and moderate-sized crustaceans, along with some which were far larger than any living species, and which certainly attained a length of 6 or 8 feet! The collections made by the Scotch geologists, in connexion with other specimens obtained by Mr. Banks, of Kingston, and Messrs. Lightbody & Cockis, of Ludlow, show us that *Pterygotus* was an elongate crustacean, with a comparatively small head and serrile compound eyes, few appendages, of which the large chelate antennae are most remarkable, being a foot long and only four-jointed,—the terminal joints forming a strong serrated claw. The large mandibles were fully 6 inches long; the maxille, either one or two pairs, with six-jointed palpi; and the great swimming feet consisting of six joints, of which the terminal ones were modified as for swimming, and the basal joints are great foliaceous expansions, which possibly assisted, like the joints of the legs in *Limnulæ*, in mastication.

forms of the legs of Crustacea, in *Decapoda*. From the explanations given by Mr. Huxley in the memoir above referred to, there is a general resemblance both in form and structure to the small Stomopod crustaceans, *Mysis* and *Cuma*, to minute forms, which must be arranged very low down in the scale of Decapod crustacea, and which are also frequently ornamented with a similar sculpture to that of the fossils. There is even a yet greater resemblance in form to the larvae of the common crab. And if this be accepted, the coincidence in essential structure between such minute and embryonic forms and these gigantic denizens of the old seas becomes most remarkable and interesting, as bearing on the course of development of life throughout geologic epochs.

'On the Position of the (Lias or Trias) Bone Bed, Geologically and Palaeontologically considered,' by Mr. R. Etheridge.—Mr. Etheridge referred this bone bed to the Lias in contradiction to Sir P. Egerton, who has assigned it to the New Red Sandstone.

'On the Time required for the Formation of Rolled Stones,' by Mr. M. MOGGERIDGE.

“Description of a Working Model to Illustrate the Formation of Drift Bedding (a kind of false stratification),” by Mr. H. C. SOREY. — This model shows how a particular kind of false bedding is produced, by the material being carried along the bottom and deposited on a slope, where the velocity of the current is so far diminished as not to be able to wash it along. By imitating a slow or quicker current, the sand was sorted and accumulated in thin bands.

⁴ Researches in Kent's Cavern, Torquay, with the original MS. Memoir of its first opening, by the late Rev. J. M'Every (long supposed to have been lost), and the Report of the Sub-Committee of the Torquay Natural History Society, by Mr. E. VIVIAN.—The substance of this memoir we have already given in another Section.

extending from Robin Hood's Bay to the neighbourhood of Flamborough Head,' by Capt. WOOD-ALL.—Capt. Woodall called attention to the fact that this reef joined the land at the point where the lower line is thrown up in contact with the inferior oolite of that part of Yorkshire. He produced a specimen, which he had obtained 20 miles to the south-east, from a depth of 20 fathoms, and attempted to prove, with considerable probability, that the reef was lassic throughout. The very straight inner margin of the reef, which extends 20 miles and upwards in one straight line, being his principal ground for such argument; and, by comparing the fossils contained in the specimen exhibited with some from the boulders of the Holderness coast, he argued that there was great probability that those fossils had originally been derived from this submerged area.

'On Gold in India,' by Lieut, AYTON, Bombay Artillery.

MONDAY.

'On the Correlation of the North American and British Palaeozoic Strata,' by Prof. ROGERS.—Prof. Rogers raised the question so often discussed between Prof. Sedgwick and Sir Roderick Murchison,—and led to a long and warm discussion between those geologists.

'On the Bone Beds of the Upper Ludlow Rock, and the base of the Old Red Sandstone,' by Sir R. I. MURCHISON.—Sir Roderick Murchison gave an account of the recent and additional discoveries made in those strata, which, whether they pertain to the uppermost beds of the Silurian rocks, or to the lowest junction strata of the Old Red Sandstone, have been grouped under the term of "Tilestones." In his original description of the uppermost Ludlow rock he had described a certain layer, near their summit, as being characterized by the remains of bones of fishes, principally the defences of *Oncus*, with jaws and teeth, and numerous coprolitic bodies. But he had also noticed, in several localities, the occurrence of a still higher bed, which seemed to form a passage into the Old Red Sandstone, and in which remains of terrestrial plants occurred. He had further pointed out, that the upper Ludlow rock was the lowest stratum in which the remains of *Vertebrata* were discovered,—an observation which has remained uncontroverted till the present day,—no remains of true fishes having yet been detected in more ancient strata in any part of Europe. In an ascending order, however, it was well known that *Ichthyolites* augmented rapidly; and the object of the present communication is to show how the recent observations of Mr. Richard Banks, of Kington, and of Mr. Lightbody, of Ludlow, have made us acquainted with the presence of fish remains in two thin courses *above* the original bone-bed of the upper Ludlow rock. The lower of these beds, which, according to the sections exhibited, occurs both at Kington and at Ludlow, was recently inspected by himself, accompanied by Prof. Ramsay and Mr. Aveline, as well

as by Mr. Salter. It is a greyish or yellowish flag-like sandstone, the lowest course of which, at Kington, contains many spines of *Onchus*, with *Lingula cornea*. This thin layer, and another softer one, full of remains of *Pterygotus*, and two species of *Pteraspis*, are surmounted by the blue or grey-hearted building-stone of Kington, with *Pterygotus*, *Lingula cornea*, &c. These again are covered by less massive beds, which contain fragments of plants and large *Pterygoti*, and which graduate upwards insensibly into more micaceous sandstones, often splitting into tiles. The *Lingula cornea* and *Trochus helicus*, together with species of *Modiolopsis*, and a small *Beyrichia*, all generally considered characteristic of the uppermost Ludlow rock, prevail throughout these strata, with occasional carbonaceous matter and traces of land vegetation; clearly indicating an upward passage towards the younger formation of Old Red Sandstone. The last-mentioned (or middle) fish bed is probably the same as that which Sir R. I. Murchison described in the Silurian system as occurring in Clun Forest and other places. It has recently been laid open by the cutting of the railroad north-east of the town of Ludlow, and exhibits similar relations,—a grey rock beneath passing into an

overlying micaceous sandstone. The same succession is obscurely traceable on the right bank of the Ferne, below Ludford. This bed is also characterized by the presence of vegetable remains, seed vessels, jaws and spines of *Oncus*, with fragments of crustaceans (*Pterygotus* and *Eurypteras*),—in short, just the same assemblage as that which occurs at Bradnor Hill, near Kington, and has been described by Mr. Banks. Again, on the right bank of the Tane, the next strata in ascending order which are visible, and which have lately been accessible owing to the dry weather, consist of micaceous brownish red sandstones and red marls, with true cornstone concretions, exposed in the bed of the river, which are again followed by other marls and sandstones, surmounted by a band of coarse, greenish, micaceous sandstone, in which are found remains both of fishes and of *Pterygotus*. The fish remains consist of distinct jaws and teeth of considerable size, of fin defences (*Oncus*), and the heads of *Cephalaspis Lyellii*, and a new species; together with these the *Lingula cornuta* occurs. The genus *Pterygotus* having now been found through the upper Silurian rocks, and even so low down as the upper Caradoc formation, can no longer be considered characteristic of the transition beds between the Silurian and Devonian rocks; and as the genera *Aphalaspis* and *Pteraspis* are now known to extend their range into true upper Ludlow strata, our views regarding the precise zoological characters, which separate the two formations, must be modified accordingly. As regards the English frontier of the Silurian rocks, the phenomena present no ambiguity; for all the strata, from the lowest bone-bed of the true Ludlow rock, which contains so many species of shells of Silurian age, to the uppermost fish-bed, which must be included in the Old Red Sandstone, do not exceed forty or fifty feet in thickness,—the upper part of the series constituting a true mineral and zoological passage into the Old Red Sandstone. In conclusion, the author observed, that the lithological term "tilestones," if applied either to the top of the upper Ludlow rock or to the base of the Old Red Sandstone exclusively, might mislead; but if applied generally to the beds of transition between the two deposits, it may still be a convenient and applicable term.

Report on Cleavage and Foliation in Rocks, Part I., by Prof. PHILLIPS.

SECTION D.—ZOOLOGY AND BOTANY, INCLUDING PHYSIOLOGY.

On a supposed Fossil Fucus found at Aust Cliff, Gloucestershire, by Mr. C. C. BABBINGTON.—Above the well-known bed containing fossils occupying the higher part of Aust Cliff, there is a bed of laminated rock nearly, or quite, devoid of fossil remains. Lately a fall of the cliff brought down a part of this upper stratum, when Mr. Brodie, the author of a well-known work on fossil insects, found between some of the thin plates of stone a substance closely resembling a *Fucus*. There being no apparent mode of accounting for its presence in that position, and no reason except its very modern appearance for doubting its fossil character, Mr. Brodie and other geologists and naturalists inclined to think it of ancient origin, and for that reason presented it to the notice of the Section. Several naturalists examined the specimen, and thought it possible that it might be a recent product,—a *Rhizomorpha*, which had intruded itself between the plates of stone. A careful microscopic examination alone can determine if it is of fungoid or algal structure, of recent or fossil date.

Dr. LANKESTER read a note from Mr. Patterson, of Belfast, respecting the blank forms for Dredging which he was requested to draw up. These dredging forms were distributed amongst the Section, and notice given that any persons wishing to obtain these blank forms could have them by application to Mr. Patterson, of Belfast.

Dr. BALL, of Dublin, exhibited a Dredge which he had found of the greatest use in making dredging excursions.

Prof. BALFOUR read the report of the West Coast of Scotland Dredging Committee. The report contained many interesting details of the perils and

successes of dredging excursions; and the lists of animals obtained will be published in the next volume of the *Transactions*.

Dr. LANKESTER inquired of those engaged in dredging what method they had found best adapted for keeping marine animals in *aqua vivaria*.—Mr. M'ANDREW said the best rule was not to put creatures together which were likely to devour one another.—Dr. BALL described an apparatus which he had used with great success in Dublin. It consisted of a tube, at the end of which was a pair of bellows; from the tube branch tubes passed into each *aqua vivarium*, so that every stroke of the bellows sent a quantity of fresh air into each tank. The amusement of pumping the air into the tanks was so great, that they had never had in the Dublin Zoological Gardens occasion to employ a man to do it, as the visitors were very fond of the occupation. On one occasion a cuttlefish had died, which they had kept for three months, and on examining into the cause it was found that the bellows were broken.—Mr. BOWERBANK stated, that a good plan was to have two vessels, and to change the creatures from one vessel to the other every day. This answered with small moveable animals.—The CHAIRMAN said that exposure to light was very injurious, and he had found that in all cases the *aqua vivarium* needed to be protected from the strong light of the sun.—The Rev. H. H. HIGGINS said that he had found in moving animals from one place to another that it was best the vessels should be quite filled, and not partially so.

'Abstract of First Report on the Oyster Beds and Oysters of the British Shores,' by Mr. T. C. EYTON.—The author said—“For convenience sake I shall divide this Report into three sections:—1st. A History of Oysters and the Laws relating to them; 2ndly. An Account of the different Beds; 3rdly. The History of the Oyster from its Embryo State in the Parent Shell until it is Seven Years old; and, lastly, a summary of deductions from the reports I have received. The oyster fisheries of England are of great antiquity,—the luxuriant Romans held the British oyster in high estimation. There have at different times been many Acts of Parliament passed for the protection of oyster-beds; the fisheries are at present, however, regulated by a Convention entered into between Her Majesty the Queen and the King of the French; and an Act passed to carry the same into effect (6 & 7 Vict. c. 79), which enacts that the fisheries shall open on the 1st of September and close on the 30th of April. The oyster-beds which I have visited or received reports from are the following:—Loch Ryan, the whole of the Welsh beds, Loch Tyne (a bed of no commercial value), Isle of Man beds, Jersey, Guernsey and Sark beds, Kentish and Essex beds. The oysters, from which the spawn I am about to mention was taken, were obtained from Loch Ryan, at the entrance to the Clyde, on the 10th of July, and were forwarded to me in a box packed in wet grass; they were thirty-two in number, of which only three proved to be in spawn: in these from a rough calculation, which I believe to be much under the mark, the number of young was about three millions. The first oyster I opened had the spawn exuded, so that it lay on one side between the folds of the mantle. The mass was of a purplish colour, and on examining it with a hand-glass I could perceive some motion, but on placing some on a glass plate under a $\frac{1}{4}$ -inch power in the microscope, I could clearly perceive that what I had taken with the naked eye for ova were living animals varying slightly in shape. The animal was semi-transparent, with two reddish elongated dots placed on each side behind the cilia, which were in constant and rapid motion. They were exceedingly tenacious of life, the cilia moving until the water was dried upon the glass. Some that I placed in a little salt and water were alive the next day. The oysters on the table have been, through the kindness of Mr. Sweeting, fishmonger, Cheapside, sent to me, and are from one to four years old. It now, therefore, only remains to trace the life of the oyster and the changes it undergoes from the state I found it in the parent until it has formed its shell and attached itself to some substance, which I hope to be able to do next

year in a continuation of this report. From the reports I have received and my own observations, I think that the fence months might be advantageously altered on many beds, and that if such alteration was made, the markets might be supplied the greater portion of the year. That the depth of water appears to be the chief cause of a difference in the time of spawning; and it is exceedingly doubtful if on some deep beds they spawn at all; and they are probably supplied by the fry drifting from some neighbouring bed in shallower water. That the commonly received opinion among the fishermen, that the oyster deposits its spawn in masses, is entirely erroneous. That oysters are best for the table out of shallow water, and at the entrance of a river if suitable ground is found, and feed quicker in such situations.” The author then read a series of questions, which it was requested any person connected with oyster-beds would be kind enough to answer and forward to him:—1. Name of fishery? 2. Depth of water? 3. Computed size of beds? 4. At what age do oysters spawn? and do all oysters above that age spawn? 5. Does the time of spawning differ on different beds within your knowledge? 6. If such difference exist, is it caused by a variation in the depth of water, or any other reason? 7. What is the ground? 8. Do the oysters differ on different sorts of ground? 9. Add any other information.

'Report on the present State of our Knowledge of the Mollusca of California,' by the Rev. P. CARPENTER.—As many of the shells of California proper extend to Sitcha, and some even to the Shantar Islands, while the shells of the *Gulf of California* belong to the Fauna of Panama and Ecuador, this report embraces the shells of the whole of the west coast of North America. The causes of error, both in ascertaining the habitat and in identifying the species of mollusks, were pointed out. An historical account was given of all the known collectors in the district, pointing out the degree of authority attached to each, with a list of species, references, synonyms, &c. Special attention had been paid to the minute shells of the Gulf, among which were pointed out several new and interesting forms. The large multitudes of shells from that district which had been lately sent to this country had brought to light many interesting points concerning the great variations in particular species. In the genus *Cæcum*, for instance, five species had been made out of different stages of growth in the same shell. All the known shells of which the exact locality was ascertained had been tabulated in columns, representing the distribution of the species, and arranged zoologically. About 800 species are known from the Gulf, and 625 from Panama, of which 218 are already known to be common to the two—89 being common to the Gulf and South America and 23 to the Galapagos, which islands have very little in common with South America, more with Panama, and some little with the Indo-Pacific province. The Proboscidiaria were found much more local than the rest of the Gasteropods, and these than the Bivalves, the spawn of which latter are borne through wide ranges by the currents. The Fauna of Upper California, as shown by the collections of Mr. Nuttall and the United States Exploring Expedition, are quite distinct from those of the Gulf; scarcely a score of species, and those in very limited numbers, are found in common. Very little is accurately known of the Fauna of the Peninsula. The shells on the Gulf side are, however, mainly Panamic, on the Pacific side Californian. Scarcely a single species is common to West America and Polynesia, while not a few appear identical with West Indian forms, especially in the Gulf. Several forms reappear on the Gambia coast. A very few reach Britain, chiefly nesting bivalves. The main object of the report was to reduce to a common estimate all that was yet known on the subject, that future students might not have to go over the same ground continually, and to point out the causes of the present very unsatisfactory state of the science, as the first step towards their removal.

The reading of this report led to a conversation on the importance of those who undertook to

describe shells and all other species of animals, taking care that they had not been previously described, and especially avoiding giving wrong localities for them.

'Report on the Artificial Propagation of Salmon in the Stormontfield Ponds at Perth,' by Sir B. JARDINE.

On New Forms of Diatomaceæ from the Firth of Clyde. by Prof. GREGORY.—The author, after referring to two papers by himself on the Diatoms of the Glenshire Sand, the marine forms in which must have come from the Firth of Clyde, proceeded to describe the material now under investigation. It is remarkable that of all the many undescribed marine forms found in the Glenshire sand, not one has yet been recorded as occurring in the Firth of Clyde. The new material was nothing more than dirt washed from some nests of lime, dredged by Prof. Allman off Arsan, in four fathoms water, on the 19th of July. After washing with acids, &c. a residue, rich in Diatoms was left. In this the author found—1. Many common species, both freshwater and marine. 2. Many known but rare or curious marine forms, such as *Navicula Hennedyi*, Sm.; *Lyra*, Ehr.; *granulata*, Breb.; *Pleurosyria transversale*, Sm.; *obscurna*, Sm.; *rigidum*, Sm.; *delicatulum*, Sm.; *Stauroneis pulchella*, Sm.; *=Stauroneis aspera*, Ehr.; *Eupodiscus Ralfsii*, Sm.; *crassus*, Sm.; *Coscinodiscus concinnus*, Sm.; *Pododiscus (Eupodiscus) sculptus*; *Podosira Montaguei*, Sm.; *Campylodiscus Horologicum*, Sm.; *Surirella fastosa*, Sm.—3. Many of the new forms figured by the author in his two papers on the Glenshire Sand, one-third

part of which will not be published till October. Those here found are *Navicula rhombica*, W. G.; *maxima*, W. G.; *maxima* var. β , W. G.; *quadrata*, W. G. (*humeura*, Breb.); *latissima*, W. G.; *angulosa*, W. G.; *angulosa*, var. β , W. G.; *formosa*, W. G.; *Pandura*, Breb.; *Crabro*, Ehr.; *incurvata*, W. G.; *splendida*, W. G.; *dedyma* γ , *costata*, W. G.; *dedyma*, W. G.; *clavata*, W. G.; *Amphora Arcus*, W. G.; *Amphifarva vitrea*, B. W. G.; *Tryblionella constricta*, W. G.; *Synedra undulata*, W. G. (= *Foxarrium undulatum*, Bailey). The above are all correctly figured in the two plates of Glenshira forms already published. The following are figured in the plate to be published in October:—*Cocconeis distans*, W. G.; *costata*, W. G.; *Amphora crassa*, W. G.; *elegans*, W. G.; *Grebilliana*, W. G.; *Amphipora minor*, W. G.; *Nitzschia insignis*, W. G.; *socialis*, W. G.; *distans*, W. G.; *Eupodiscus sparsus*, W. G.; *Campylodiscus simulans*, W. G.; and another disc not yet named. It thus appears that about thirty of the new marine forms of the Glenshira sand occur in this material, as might be anticipated from the connexion between Glenshira and Loch Fine, which is an arm of the Firth of Clyde.—*4. Marine forms which appear to be restricted to the Glenshira sand.*

4. Many forms which appear to be entirely new. These consist of—*a.* Naviculae and Pennulaice, of which there are several chiefly small, but there is one very fine large Navicula, of very peculiar aspect, to which the author gives the name of *Navicula picta*. It has a marginal and two medial striated bands, and the space between these is irregularly powdered with round granules, the same as those of which the striae are made up. One of the smaller forms exhibits, at one focal distance, a striated marginal band, at another, the whole valve is seen to be striated. There are several others, which the author has not had time as yet to study. *b.* Filamentous forms, of which there are several. One is apparently a Denticula, a fine large form, which, as no marine species of the genus are known in Britain, the author names, provisionally, *Denticula marina*. Four appear to be species of *Zygooceros*, two of which are rather large, and two smaller. A predominant form in the material is a small disc, possibly = *Coscindiscus minor*, Sm. But it is here seen to be an Orthosira. *c.* Cocconeides. There appear to be three or four species of *Cocconeis*, which are only mentioned, not having been fully studied. Two of these are allied to *C. distans*, which also occurs as above stated, and is both frequent and fine, and, notwithstanding the opinion of Prof. Smith, is held by the author to be entirely distinct from *C. Scutellatum*. *d.* Discs. These are some apparently new discs, the finest of which is a large *Campylo-*

discus, allied to *C. Ralfsii*, which the author has also found in the Glenshira sand, but has not yet described. *e. Amphore*. Of this genus, of which the Glenshira sand has yielded so many and such remarkable new species, this material, besides several of the Glenshira forms, including two of the finest, *A. crassa* and *A. Grevilleiana*, has yielded a large number of new, and in most cases very remarkable species. One of these is nearly square, one is linear with an expansion in the middle, and one is linear with two such expansions. There are probably about ten new species of *Amphora*, but it has been impossible in so short a time to determine them properly. Almost all the forms which have been named above, whether known or undescribed, occur finely developed, and there are also very fine specimens of many forms which have not been named. On the whole, the author trusts that this preliminary notice will show how much remains to be done among marine diatoms, and how desirable it is that marine deposits on mud should be carefully and minutely searched.

'On the Pearls of the Conway River, North Wales,' by Mr. GARNER.—In this paper the author pointed out that there were two sources of pearls in the Conway. The first was the common Mussel, *Mytilus edulis*, found at the mouth of the Conway, and, second, the *Unio marginiferus*, a freshwater mussel, high up the river. The first were collected by the people as bait and food for swine, and yielded very miserable useless pearls; but the second very frequently produced very fine pearls indeed. Specimens of these pearls were exhibited to the Section.

The PRESIDENT stated that the finest pearls were always found immersed in the mantle of the animal. Very good pearls might be procured by boring the shells of the *Unio* nearly through, when the creature secreted over the holes a pearl.—Prof. GREGORY stated that he had often collected pearls from the *Unio margaritiferus* in the Tay, and larger than any of those now exhibited.—Dr. LANKESTER alluded to the fact that Linnaeus had succeeded in forming pearls in the freshwater mussel by introducing grains of sand between the mantle and the shell. Linnaeus had never communicated this fact to the world, as he anticipated being able to make his fortune by the discovery, but he died without realizing his hopes.

'On the Morphological Constitution of the Skeleton of the Vertebrate Head,' by Prof. GOODSR. — This was a profoundly learned paper on the subject of the homologies of the bones of the head of vertebrate animals, and occupied two hours and a half in the delivery. The Committee of the Section requested that it might be published entire with Prof. Goodsr's other morphological papers in the *Transactions* of the Association.

FRIDAY.

SECTION E.—GEOGRAPHY and ETHNOLOGY.

'Researches in the Crimean Bosphorus, and on the site of the Ancient Greek City of Panticapeum (Kertch)', by Dr. D. MACPHERSON.—The present town of Kertch is built close to the site where 500 years b.c. the Milesians founded a colony. About fifty years before Christ, this colony became subject to Rome, or rather a Satrap of the Roman Empire, from the circumstance of the Bosporian kings, who were also rulers of Pontus, having been subdued by this people in Asia. In the year 375 of our era, the colony was utterly annihilated by the Huns. Barbarous hordes succeeded one upon another thereafter until A.D. 1280, when the Genoese became possessors of the soil, and held it until expelled by the Turks in 1473; they being in their turn expelled in 1771 by the Russians. The characteristic features around Kertch are the immense tumuli, or artificial mounds, that abound in this locality, more especially within the second vallum. These sepulchres of the ancient world are found in many places. We have them in the form of barrows in England, and cairns in Scotland. Calculated as they are for almost endless duration, they present the simplest and sublimest monument that could have been raised over the dead. The size and grandeur of the tumuli found in this locality excite astonishing ideas of the wealth and power of the people by whom they were erected,

for the labour must have been prodigious and the expenditure enormous. The highest specimens of Hellenic art have been discovered in these tumuli—such as sculpture, metal, alabaster and Etruscan vases, glass vessels, remarkable for their lightness, carved ivory, coins, peculiarly pleasing on account of their sharpness and finish, and trinkets, executed with a skill that would vie with that of our best workmen. All originals were forwarded to the Hermitage, at St. Petersburg, duplicates being preserved in the Museum at Kertch, and these might have been with ease secured to England on the investment of the place by the Allies; but with the exception of some bas-reliefs, which, in connexion with other two officers, I transmitted to the British Museum, the whole of these rare treasures were barbarously made away with. The local tradition is, that these tumuli were raised over the remains, and to perpetuate the memory, of the kings or rulers who held sway over the colonists, and that the earth was heaped upon them annually on the anniversary of the decease of the prince, and for a period of years corresponding to the rank or respect in which its tenant was held, or had reigned; and to this day successive layers of earth, which were laid on in each succeeding year, can be traced in their coating of sea-shell or charcoal having been first put down. I have counted as many as 30 layers in a scarp made in one of those mounds, about two-thirds from its base. They are to be seen of all sizes, varying from 10 to 300 feet in circumference, and in height from 5 to 150 feet and are usually composed of surface soil and rubble

and are usually composed of surface soil and rubble masonry. Herodotus's reference to these sepulchres is the earliest account which history has recorded of this mode of burial; and I would particularly draw your attention to his description of the mode adopted by the Scythians to perpetuate the memory of their deceased princes, for you will hereafter see that one of my excavations correspond exactly with the description given by him. "The tombs of the Scythian kings," he states, "are seen in the land *Gberri*, at the extreme point to which the Borysthene is navigable. Here, in the event of a king's decease, after embalming the body, they convey it to some neighbouring Scythian nation. The people receive the royal corpse, and convey it to another province of his dominions, and when they have paraded it through all the provinces, they dig a deep square fosse, and place the body in the grave on a bed of grass. In the vacant space around the body in the fosse they now lay one of the king's concubines, whom they strange for the purpose, his cup-bearer, his cook, his groom, his page, his messenger, 50 of his slaves, some horses, and samples of all his things. Having so done, all fall to work, throwing up an immense mound, striving and vying with one another who shall do the most." The Greeks, who always respected the religion of the countries they had subjugated, and who, in process of time, imbibed, to a certain extent, their customs and observances, appear to have adopted this Scythian mode of burial. Instead, however, of placing their magistrates or rulers in a "deep square fosse" dug in the earth, they built tombs, and over these raised the conical hill. But I examined several without meeting with any success. All, or nearly all, of these tumuli have been already explored. Not far from Mons Mithridates I came upon a portion of an aqueduct which probably conveyed water to the Acropolis. It was formed of concave tiles; one of these, with a Greek name thereon, I have brought with me. On one occasion I arrived at a place where five stone tombs were found adjoining, neither of which contained any relic, but in a spot contiguous a large ornamented earthenware jug and five glass cups, one within the other, were discovered. It was not unusual thus to find the remains in one spot and the ornaments in another. On removing the earth off the sides of a rock, the apex of which was only perceptible on the summit, I struck upon a recess, three sides of a square chiselled out of the rock 16 feet in length and 8 in depth. Following this, I reached a stone seat; hewn out on each side of this seat small recesses had been made, apparently for the purpose of receiving lamps. After descending 12 feet I came to human remains, and for five days the workmen turned nothing out of this pit but

human bones. How far these would have descended I know not, for I ceased my explorations here, feeling satisfied, from the appearance of the bones, that they must have been placed there at the same period—the result, most probably, of some great engagement, for many of the skulls and long bones presented fractures and injuries. The marks on the rock would indicate that sacrificial meetings, possibly commemorative of the event, was held here. Replacing these remains, I proceeded to a point indicated as the tombs of the diminutive or pygmy race, but discovered nothing that would indicate a peculiar class of people. Beneath an extensive sloping artificial tumulus, running at right angles with the ridge extending northwards from Mons Mithridates, I came upon a mass of rubble masonry, beyond which was a door leading to an arched chamber, built under the side of the mound. This led me to a larger chamber, which was also arched. The walls of the larger chamber were marked off in squares, with here and there flowers, birds, and grotesque figures. Over the entrance into this chamber were painted two figures of griffins rampant, two horsemen, a person in authority and his attendant—the latter carrying in his hand a long spear—being rudely sketched on one of the inner walls. There were no remains of any sort in this tomb or temple. A recess in the walls on two sides resembled doors blocked up. On removing the masonry to the right, the skeleton of a horse was found. To the left a human skeleton lay across the door. Tunnelling on each side, the work was carried on beneath the descents of former explorations from above. On the right-hand side the tunnel extended ten yards, but nothing of interest was met with. On the left, descending as the tunnel was formed, arriving occasionally at objects possessing much interest, I came upon a layer of natural slate rock, the sides and roof of the tunnel being composed of artificial soil, charcoal, animal remains, and, as usual, heaps of broken pottery. Thirty feet from the entrance, the rock suddenly disappeared to the front and left, the mark of the chisel being perceptible on the divided portion. Tunnelling in the rock, we again reached 12 feet from the spot where it had disappeared, loose sand occupying the intervening space, into which the exploring rod, six feet long, dropped without any effort. I worked down into this shaft 12 feet. But the left side of the shaft, which was composed of the same loose sand as far as the steel rod could reach, was continually falling in. Moreover, the labour carried on by candle-light of raising the earth in baskets, and conveying it in wheelbarrows to the outside through the building was becoming very arduous, and I was compelled to abandon the work. At this period no relics or remains of any sort were discovered, and the steel rod sunk into the loose sand as if it had been so much flour. I felt satisfied that this shaft led to rich treasures below, but regard for the safety of my workmen prevented my proceeding deeper. The tunnel was carried on a few feet further, and the earth allowed to drop into the shaft. I now sought out other ground, and selected a place removed about 100 yards from that I had just left. Descending some ten feet, I struck upon a tomb cut out of the solid rock. Not far from this my attention was attracted to an excavation in the rock, somewhat similar to, but on a much smaller scale, than that large descent which I had just abandoned. Clearing the surface, I found that the rock was hewn out 3 feet in width and 12 in length, the intervening space being filled with sand, similar in all respects to the other into which the steel rod sunk with ease. Fifteen feet of this sand being removed, I came upon the skeleton of a horse. A few feet further on, an upright flag, four feet high, and the breadth of the shaft, was placed over the entrance of a tomb cut out of the calcareous clay. The opening faced the east by an arched door, 24 inches wide and 32 high. The tomb was of a semi-circular form, arched, 10 feet by 12 in diameter, and 8 feet high in the centre. Above the doorway a lintel-stone was placed, on which the slab which closed it rested. The cavity was cut out of the natural calcareous clay, which was firm and consistent, the form and shape of the instrument by which it had been re-

moved being very distinct. The candle burnt brightly on entering. The floor was covered with beautiful pebbles and shells, such as are now found on the shores of the Sea of Azov. A niche was cut out of the walls on three sides, in which lay the dust of what once was human. It was a sight replete with interest to survey this chamber—to examine each article as it had been originally placed more than 2,000 years ago—to contemplate its use, and to behold the effect of 20 centuries upon us proud mortals. There lay the dust of the human frame, possessing still the form of man. The bones had also crumbled into dust; the space once occupied by the head did not exceed the size of the palm of the hand, but in the undisturbed dust, the position of the features could still be traced. The mode in which the garments enveloped the body, and the knots and fastenings by which these were bound, being also distinct. On each niche a body had been placed, and the coffins, crumbled into powder, had fallen in. At the head were glass bottles—one of these contained a little wine. A cup and a lacrymatory of the same material and a lamp were placed in a small niche above. A coin and a few enamelled beads were in the left hand, and in the right a number of walnuts—the wine and nuts being doubtless placed there to cheer and support the soul in its passage to Paradise. Some fibulae and common ornaments, valuable only on account of their antiquity, were also found. Continuing my researches in the same locality, I came upon other similar shafts, at the end of which were the bones of a horse, and then the large flagstone closed the mouth of tombs similar to the last. I now resolved to make another attempt to explore the great shaft: the only mode of effecting this being to remove entirely that portion of the hill above it, I brought all my labourers to the spot, although the few days that remained of our sojourn in Kertch would hardly enable me, I feared, to complete the work. Placing my men in two gangs, each were made to work half-an-hour without ceasing. On the third day we struck on two large amphoræ, containing each the skeleton of a child between four and six years of age. Underneath these were the tombs of two adults, and then came the skeleton of a horse. There was now every indication that a great feast or sacrifice had been held, for a few feet further on we came upon immense heaps of broken amphoræ, fragments of wine jars, the inside of which were still encrusted with wine lees, broken drinking cups, flat tiles which may have served the purpose of plates, beef and mutton bones, fragments of cooking pots still black from the smoke, and quantities of charcoal. Descending still further, we came upon what appeared to have been a workshop—portions of crucibles in which copper had been smelted, corroded iron, lumps of vitreous glass, broken glass vessels, moulds, and other things being found. Five feet deeper we exposed the excavation in the rock, and a shaft exactly similar to, but on a much larger scale than the descent into the arched tombs. As the hill was removed, platforms were scarped on the sides, on which the earth was thrown up, a man being placed on each platform; and as I descended into the shaft, similar platforms of wood were slung from above. On the twelfth day we reached a depth of 16 feet in the shaft, the portion of the hill removed being 38 feet in length, 20 in depth, and 12 in breadth. The mouth of the shaft hewn out of the rock, 3 feet in thickness, was 18 feet long by 12 broad. It then took on a bell shape, the diameter of which was 22 feet, cut out in dark consistent clay, a depth of nearly 7 feet. Beyond this the size of the shaft became a square of seven feet, cut out of successive layers of sandstone and calcareous clay. When we had attained a depth of 30 feet in the shaft, the labour of raising the earth became very great; but by means of a block and shears, which Capt. Commerell, of Her Majesty's ship *Snake*, very kindly fixed over the descent, the work was much facilitated, the earth being slung up in baskets, and the men ascending and descending in the same manner. A few feet beyond the bones of the horse, and exactly in the centre of the shaft, the skeleton of an adult female appeared enveloped in sea-weed. Under the neck was a lacrymatory, and on the

middle finger of the right hand a key-ring. Three feet further we met a layer of human skeletons, laid head to feet, the bones being here in excellent preservation,—as, indeed, we found them to be in all places where the calcareous clay came into immediate contact with them. There were 10 adult male skeletons on this spot, and separated by a foot of clay between each. Five similar layers were found, being 50 in all. I may state that toads in large numbers were found alive in this part of the pit. We had now reached a depth of 42 feet in the shaft, the bones of another horse were turned out, and then we came on loose sand to a depth of 5 feet. Six more skeletons were here again exposed. The sides of the shaft were regular and smooth, the mark of the chisel on the rock being as fresh as when first formed. Six feet more of the loose sand being now taken away, hard bottom could be felt by the steel rod, and there lay two skeletons, male and female, enveloped in sea-weed; and in a large amphora at the corner, which was unfortunately found crushed, were the bones of a child. Some beautiful specimens of pottery, an electric urn, much broken, lacrymatories, beads, and a few coins, were all that I got to repay my labours on this spot. I examined well on every side, and in the rock below, for a trap-door or concealed passage, and an abrupt perpendicular division in the natural strata or layers of calcareous clay appeared to indicate the existence of such, but I found none. Everything during the descent had promised so very favourably, that I fully expected to have found a large chamber leading on from the termination of the shaft; but if such does exist, the discovery of the passage to it utterly baffled all my researches. When the coins I discovered are cleaned, I shall probably be able to fix a date to this wonderful place. The deep fosse, the mode in which the skeletons were found at the bottom, the 5 discovered immediately above these, the 50 about the centre, and the bones of the horses, are exactly in harmony with the description of Herodotus of the mode in which the Scythian kings were buried. The substance which I have called sea-weed, from its bearing a stronger resemblance to that production than anything else I can compare it with, may possibly be the "grass" described by Herodotus as used to envelope the body. If such be the case, the description is in all respects exact. There was no time to enter upon fresh explorations.

'Vesuvius and its Eruptions; Illustrated by a Splendid Collection of Drawings by W. Bayliss,' by Mr. F. D. HARTLAND.

'On Recent Discoveries in Australia,' by Capt. C. STURT.

'The Route between Kustenjeh and the Danube,' by Capt. SPRATT, C.B.

'Report relating to the Search for Sir John Franklin,' by Mr. J. ANDERSON.

'On the Site of Ecbatana,' by the ARCHDEACON of CARDIGAN.—This paper led to a lively passage of arms between the Archdeacon of Cardigan and Sir Henry Rawlinson; which closed in the Archdeacon promising to print his paper at an early date, and in Sir Henry Rawlinson promising to examine its arguments closely and in detail.

MONDAY.

'On the Forms of Anglo-Saxon Crania,' by Mr. J. B. DAVIS.

'Notes on some Antiques found at Cirencester, as Evidence of the Domestic Manners of the Romans,' by Prof. BUCKMAN.

'On the most Ancient Map of Australia,' by Sir T. PHILLIPS.

'On the most Ancient Map of the World, from the Propaganda, Rome,' by Mr. F. D. HARTLAND.

'Report on his Expedition up Smith's Sound in Search of Sir John Franklin,' by Dr. E. K. KANE.

'The Arctic Current around Greenland,' by Capt. IRMINGER, R.D.N.—Many hydrographers assert that a current from the ocean around Spitzbergen continues its course along the east coast of Greenland, and thence in a nearly straight line towards the banks of Newfoundland. In this opinion I do not agree. Considerable quantities of ice are annually brought with the current from the ocean around Spitzbergen to the south and south-west along the east coast of Greenland, around Cape Farewell, and into Davis Strait. These enormous

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masses of ice are frequently drifted so close to the southern part of the coast of Greenland that navigation through it is impossible. To demonstrate the existence of this ice-drift, I may mention the following extract from the log-book of the schooner *Activ*, Capt. J. Andersen. This vessel belongs to the colony of Julianehaab, and is used as a transport in this district:—7th of April, 1851, the *Activ* left Julianehaab, bound to the different establishments on the coast between Julianehaab and Cape Farewell. The same day the captain was forced by the ice to take refuge in a harbour. Frequent snow-storms and frost. On account of icebergs and great masses of floe ice inclosing the coast, it was impossible to proceed on the voyage before the 23rd, when the ice was found to be more open; but after a few hours' sailing the ice again obliged the captain to put into a harbour. Closed in by the ice until the 27th. The ice was now open, and the voyage proceeded until the 1st of May, when the ice compelled him to go into a harbour. In this month violent storms, snow and frost. From the most elevated points ashore very often no extent of sea visible; now and then the ice open, but not sufficiently so for proceeding on the voyage. At last, on the 6th of June, in the morning, the voyage was continued; but the same evening the ice inclosed the coast, and the schooner was brought into "Blaesbuellet," a port in the neighbourhood of Cape Farewell. The following day the voyage was pursued through the openings between the ice; and on the 18th of June the schooner arrived again at Julianehaab. Whilst the masses of ice, as above mentioned, inclosed the coast between Julianehaab and Cape Farewell, the brig *Lucinde* crossed the meridian of Cape Farewell on the 26th of April, in lat. 55° 3' N. (101 nautical miles from shore), and no ice was seen from the brig before the 2nd of May, in lat. 55° 26' N., and 50° 9' W. of Greenwich. Further, Capt. Knudsen, commanding the *Neptune*, bound from Copenhagen to Julianehaab, was obliged, on account of falling in with much ice, to put into the harbour of Frederikshaab on the 8th of May, 1852, and was not able to continue his voyage to Julianehaab before the middle of June, because a continuous drift-ice (icebergs as well as very extensive fields) was rapidly carried along the coast to the northward. Capt. Knudsen mentions, that during the whole time he was closed in at Frederikshaab he did not a single day discover any clear water even from the elevated points ashore, from which he could see about 28 nautical miles seaward. Whilst the *Neptune* was inclosed by the ice at Frederikshaab the brig *Baldur*, on the home passage from Greenland to Copenhagen, crossed the meridian of Cape Farewell on the 9th of June in lat. 55° 9' N. (100 miles from shore) in clear water, and no ice in sight. From the above it is evident that the current from the ocean around Spitzbergen, running along the east coast of Greenland past Cape Farewell, continues its course along the western coast of Greenland to the north, and transports in this manner the masses of ice from the ocean around Spitzbergen into Davis Strait. If the current existed, which the before-named writers state to run in a direct line from East Greenland to the banks of Newfoundland, then the ice would likewise be carried with that current from East Greenland; if it were a submarine current, the deeply-immersed icebergs would be transported by it; if it were only a surface-current, the immense extent of field-ice would indicate its course, and vessels would consequently cross these ice-drifts at whatever distance they passed to the southward of Cape Farewell. But this is not the case: experience has taught that vessels coming from the eastward, steering their course about 2° (120 nautical miles) to the southward of Cape Farewell, seldom or ever fall in with ice before they have rounded Cape Farewell and got into Davis Strait, which is a certain proof that there does not exist even a branch of the Arctic current which runs directly from East Greenland towards the banks of Newfoundland.

"Remarks on the Esquimaux," by Dr. RAE.—Dr. Rae referred to his intercourse with the Esquimaux during his explorations in search of Sir John Franklin in the Arctic Seas.

Sir R. I. MURCHISON referred to the failure

which had attended all the expeditions sent to that region in search of the lost navigator. He held the opinion (an opinion shared in by the President of the Royal Society, by Lord Ellesmere, and by many other learned and distinguished persons) that it was the bounden duty of the country not to leave unsearched the small area in which the *Erebus* and *Terror* must still be frozen up. It was well known that in those frigid regions everything was preserved for many years without a symptom of decay, and as the *Esquimaux*, even if so minded, had not the means of breaking up the heavy timber and iron-work of the vessels, they must still be lying within a radius of some 200 or 300 miles. If a diligent search were made in that locality, he had no doubt but that the long-boats might be recovered, and with them, in all probability, the records of the Expedition. He was sure the public would be interested to hear that the Committee of the Section of Geography and Ethnology had that day passed a resolution to present a memorial to the First Lord of the Treasury, in common with other learned Societies, praying that the Government would sanction another Expedition to make a renewed search for the remains of Sir John Franklin and his gallant band.

SATURDAY.

SECTION F.—ECONOMIC SCIENCE AND STATISTICS.

"On some Statistics bearing upon the Relations existing between Poverty and Crime," by Mr. W. M. TARTT.—After alluding to the frauds committed by those who were in the enjoyment not merely of competence, but of luxury, he contended that, although poverty might be a predisposing, it was rarely an immediate cause of crime till allied with drunkenness and ignorance. It was proved by prison returns from the manufacturing districts of Lancashire that crime increased during periods of prosperity; and diminished (sometimes even to the extent of 40 per cent.) in immediately succeeding periods of adversity; plenty leading to vicious indulgence, while poverty was the severe teacher of economy and restraint. The same return showed that the greater proportion of crimes committed were directly or indirectly to be traced to drunkenness. At the assizes for Lancaster in the year ending in March, 1854, out of 380 of the worst cases, 250, including 9 murders, were traceable to this vice; and of the male prisoners who came under the notice of the Chaplain of the County House of Correction in 1853 and 1854, 1,088, or 41 per cent., were incapable of reading; 938, or 36 per cent., were unable to repeat the Lord's Prayer with any approach to accuracy in the words or proper comprehension of their meaning; and 1,836, or 72 per cent., were unable to understand the import of the plainest language necessary to convey instruction in moral and religious truth. Similar results were shown by the returns from other places. The remedy was the greatest difficulty. Something, perhaps, might be accomplished by getting rid of the monstrous anomaly of raising revenue from the vices of the people; for whatever may be shown by tabulated returns, he could not but believe that the establishment of beerhouses had been the greatest incentive to crime that was ever sanctioned by legislative enactment. One of the Judges (Mr. Justice Wightman) had declared his belief that drunkenness would ultimately be eradicated by moral and religious instruction. Mr. Tartt hoped, however, that, as the vices of the higher classes are imitated by those below them, their virtues may also have some influence, and that the temperance which has been substituted for debasing excesses in the one may before long be witnessed in the other.

A discussion followed, in which Mr. M. D. HILL, Dr. FARR, Mr. HASTINGS, Mr. B. BAKER, Prof. HANCOCK, and Lord STANLEY took part.

"On the Statistics of Cheltenham," by Mr. R. BEAMISH.

"On the Tendency of European Races to become extinct in the United States," by Mr. E. CLIBORN.

"Suggestions on the People's Education," by the Rev. C. H. BROMBY.—According to Mr. Bromby, the defects of the present system are:—

1. The pupil-teacher is apprenticed at an age too early to know his natural fitness for the office. He is often coaxed into it at sixteen, and at eighteen finds he has no heart for the work, becomes desultory in character, and loses rapidly in moral tone. 2. There is a want of unity of action in everything that relates to school keeping. Each of Her Majesty's Inspectors has his peculiar views of school-fittings, school-method, and school-organization. A master is written down by one, and held up another year as a model. This is a growing evil, and the more so as new regulations place the master more and more absolutely in the hands of the Inspector. 3. The third great defect is,—the present system fails to carry help where help is most imperatively wanted. The problem which proposes to supply this defect has not been solved. No measure can succeed which does not distinctly show that the working of the present system will not be arrested. It is premature to supplement operations which are extending themselves every year. The only way is to begin with Reformatory and Ragged Schools, and so work upwards to meet the present system. In this way the religious jealousy of denominations will be avoided, for they never quarrel about ragged children. Those who object to all religious teaching, except what is formal and technical, will not object, for they cannot object to convert the dangerous classes into new elements of social strength. Now, will the advocates of national economy object? They knew that a million spent upon moral and industrial training will save ten millions in county rates. The simple state of the case is, that two millions are neither at work nor school. The question is, how shall we obtain hold of them? Refuse to feed by out-door relief those who attend no school. This would reduce the two millions by one-half. A fourth below might remain untouched, and another fourth above those who receive out-door relief. But the lower fourth might be thinned by the provisions of Reformatories, and the fourth above them, who are the children of parents able but unwilling to educate them, would be stimulated by the improvement of those below them, and threatening to supplant them in the walks of life and industry. The paper dwelt much upon compulsory attendance of school, and canvassed the question for what amount of compulsion were we in England prepared? We are prepared, if not to fine the parent of the neglected child, yet to withhold parochial relief from them except on condition of school attendance. We are prepared to make a certificate of school attendance a condition of exercising the elective franchise. Beyond this it is better to foster than to tax. The writer looked favourably upon the employment of educational tests as passports to clerkship in public offices. The example of government had been happily followed by the Society of Arts, who have established a system of examination and granting certificates of merit. A large number of capitalists, both individuals and corporate, had signed a declaration that they would give preference to candidates for their more lucrative offices who held these certificates. The paper dwelt also upon the necessity of Government establishing institutions of secondary education. In France we find *écoles de dessin* and schools of trade; but in England, the workshop of the world, where there is no law to compel attendance in the primary school, there is no opportunity of learning the principles of trade in the secondary school. The time has gone by when England can safely trust to the coal and iron, when steam can chiefly convey the raw material to countries who are educating their skilled operatives. Another instrument of secondary education is the establishment of free libraries. The writer explained Mr. Ewart's Bill, and quoted from a parliamentary paper testimonies to its successful working. The last subject treated was, the subjects proper for school instruction. Much stress was laid upon the cultivation of physical science, which was followed by remarks upon the now popularly-advocated subject of "Common things," the reverend gentleman afterwards observing:—"I say nothing of moral effects upon the mind, as I should trespass out of bounds, except so far as moral advancement must tell upon the value of labour.

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In seasons of prosperity which is the more useful artisan, the man of awakened faculties, or the man who is but a living machine? In times of commercial depression, the man who folds his arms in the helplessness of despair, or the man who, in the spirit of self-reliance, has prepared himself to battle against the possible contingency of misfortune?

MONDAY.

'On the Diversity of Measures in the Corn Markets of the United Kingdom,' by the Rev. J. DANSON.—Taking the current circulars of upwards of twenty firms engaged as corn-factors in as many of the principal corn markets of the kingdom, Mr. Danson enumerated the various measures upon which the prices were quoted, some having reference to capacity only, some to weight only, and some to both; and the weights used varying with nearly every change of locality. In London the bushel of wheat and all other grain is determined by the imperial measure. In Liverpool a bushel of wheat means 70 lb.; in Birmingham, 62 lb.; in Gloucester, 60 lb.; and in Newcastle-on-Tyne, 63 lb. Again, in Birmingham, a bushel of barley means 49 lb.; in Gloucester, 50 lb.; in Leeds, 52½ lb.; and in Newcastle, 56 lb.; and to extend the field of comparison only extends the variety of measures to be dealt with. The following evils were specified, as resulting from this want of uniformity in these markets, where, since the promulgation of the Imperial Measures Act, it is vulgarly supposed that tolerable uniformity has existed:—

1. That in almost all cases in which a seller or buyer of agricultural produce has occasion to resort to more than one market he is compelled to deal with more than one mode of ascertaining the quantity sold; and that, while such differences answer no good purpose whatever, they check the freedom of commercial intercourse, afford facilities for the commission of fraud, often cause mistakes and disputes, and always involve trouble and loss of time. 2. That the quotations by which producers, dealers, and the public seek to inform themselves of the variations of the price of the same commodity at the same time in different parts of the kingdom (in order to their equalization by the legitimate action of trade), are deprived of a great part of their proper utility, in consequence of the weights or measures quoted for each locality being very commonly unintelligible in most others. 3. That the inconveniences thus arising are increased precisely in proportion as the commercial intercourse of each locality with every other in the kingdom is promoted by the improvement of road and postal communication; and, hence, are now much greater than they were when reported on by the Parliamentary Committee of 1833, and are growing greater year by year.

'A Deduction from the Statistics of Crime for the last Ten Years,' by Prof. R. H. WALSH.—A theory has lately grown up that when the people suffer privation they refrain from crime, but fall into excesses when prosperity returns. This notion, opposed to the *malesuada famæ* of the poet, is based on some criminal statistics, principally composed of the records of summary convictions in a few localities. But it is not fair to estimate the morality of a nation by the number of petty offences committed in one or two districts, or even throughout the entire country. The returns of the summary convictions before magistrates do not afford a correct test either of the number of prohibited acts committed, or of the guilt of the perpetrators. Most of the offences which swell these returns are of a most trivial character; and at one time the acts which constitute such offences are committed with impunity, while, at another, the excessive vigilance of the police, and over-energy of the public in the assertion of their rights, let nothing escape. But even if these alternate fits of remissness and zeal (the necessary consequences of the petty nature and trivial character of the offences in question) did not occur, and the summary convictions afforded a true representation of the *quantum* of prohibited acts committed, the test they furnish must be objected to. The accurate measure of crime is to be found in the returns of offences sent for trial to assize and quarter sessions. These are usually of a serious and well-defined character; and for that very reason, the acts

which constitute them are rarely committed without being made the subject of legal investigation. These are the returns to be employed in measuring the morality of a nation, and they should not be mixed up with the summary convictions. To do so is to be guilty of the absurdity of confounding together, as if they were on a footing of equality, the most serious offences and trifling misdemeanours, and placing in the same category with the robber and the murderer the man who slighted the dignity of a policeman, heedlessly offends an irascible wayfarer, or happens to drive on the wrong side of the road. The returns of the committals for trial at assize and quarter sessions in England and Wales from 1844 to 1854 (the last year for which they have been published) show clearly that crime increases when the physical condition of the people deteriorates, and vice *versa*. In 1844 the number of committals was 26,542; in 1845, 24,308; 1846, 25,107; 1847, 28,833; 1848, 30,349; 1849, 27,816; 1850, 26,813; 1851, 27,060; 1852, 27,510; 1853, 27,057, and in 1854, 29,359. The first year in which the committals increased is 1847, a year of distress. The rise then being nearly 4,000. This rise was maintained with an addition of nearly 1,500 in 1848, likewise a year of distress, partly owing to the same causes as in 1847, and partly on account of political disturbances and apprehensions. In 1849, the causes which before had depressed the condition of the labourer, died away. Food was cheap and employment abundant. Emigration had removed many of the working classes, and those who remained at home found the demand for their services increased; and in that year we find the committals decline by nearly 2,500. The succeeding years were likewise seasons of prosperity, and during these the criminal returns exhibit no marked fluctuation. In the last year of the series the number of committals rose by a little over 2,000, but at the same time the condition of the people was impaired owing to the enhanced price of food and other necessities of life, and also to the waste of the national resources and partial derangement of trade occasioned by the war. It may be observed in conclusion that, if the number of committals in 1844 was but 26,542 and in 1854 29,359, the population had increased in the interval in a greater proportion. The criminal returns for Ireland tell a similar tale, when we take into account the changes experienced in the physical condition of the people. Indeed, the lesson is the more instructive from the fact of the changes in the condition of the people having been greater than those experienced in England, so that the corresponding fluctuations in crime exhibit more strongly the marked connexion between the two. During the years of distress the committals rose to over 40,000, and when prosperity visited the land they fell to less than a fourth of that number. The returns of the summary convictions (as might be expected) do not exhibit in their fluctuations any constant relation to the changes in the physical condition of the people. But, as far as they go, they more frequently follow the same than an opposite course to that of the other criminal returns. So much for the results of the statistics of summary convictions, the class of offences from which it had been inferred that poverty and privation are conducive to popular morality. But, taking the statistics of real and formidable offences, we arrive at the more agreeable conclusion that, when the people are comfortable they are well conducted, while it is only when they suffer privation a general increase of crime takes place.

'Statistics and Suggestions connected with the Reformation of Juvenile Offenders,' by Mr. T. B. L. BAKER.—Mr. Baker is the founder and manager of the Hardwicke Reformatory. He produced some local statistics of juvenile crime, showing that the number of boys of eight to fifteen years convicted in the Cheltenham district of any offence since the 1st of January, 1852, was 149. Of this number fifty-one had been twice convicted, eight three times, and one four times. Of these youthful prisoners many had had a fair education, or could read and write, and the statistical result in that point of view did not show that mere reading and writing promoted the necessity of Reformatory Schools. Mr. Baker explained that the object of

the Reformatory School was to clear out the district of all who might be termed regular thieves, and gradually to reduce to the lowest amount of criminality which might be considered to confer the title of regular thieves. This, he said, must vary in different towns. In Liverpool, from which place he had lately had several boys, there were many who lived entirely by plunder for years together; and a boy who usually works, and only occasionally steals, even though he might be three or four times convicted, was comparatively a trifling case. In Cheltenham he did not believe that for the last three years there had been a single boy belonging to the place who had gained one-half of his keep dishonestly for a month together. The term, therefore, "regular thief," is applied to all who had been convicted a second time, even though many of the cases were extremely slight. Extracting from the total number of convicted boys returned by the Cheltenham police, all those who either were convicted a second time, or whose first offence was considered sufficiently serious to send them to a reformatory school, it gave a total of fifty-four regular thieves; i.e., either twice convicted, or such as were thought worthy of being sent to the Hardwicke Reformatory on a first conviction. Of these, thirty-nine had been, or still were, at Hardwicke, eight were long past age, and seven are still in the town. Of these, numbers have not been convicted since 1854, two have been committed for six weeks, but were not considered subjects for Hardwicke; two were committed for fourteen days, and one for a month. Considering that in January, 1852, there were twenty boys who had been twice, thrice, and four times convicted, this result he (Mr. Baker) considered not unsatisfactory. With regard to the thirty-nine boys who had been, or were, at Hardwicke, he by no means pretended that all were "reformed" past the possibility of again falling into crime. He could not predicate more of them than he could of himself. But all had, at least, been kept long enough away from Cheltenham to break the course of education which was being handed down from boy to boy. Of thirteen who had left the school, six were doing well; one fallen, but hopeful; three bad, but never convicted; one he had not heard of lately. The other twenty-four were still either in his (the Hardwicke) school, or in others, where probably situations would be found for them. That would keep most of them away from Cheltenham. He was by no means one of those who abused the prison system. In many points it was admirable; but it certainly had the grand failing—that after a boy, or man, had undergone his punishment, he was returned to the world with very little capability of earning an honest livelihood, or doing anything but steal again. Now, he thought they might say:—1st, that they had been able at Hardwicke to receive for two years all regular thieves, and to break their connexion with others; 2ndly, that they had wiped off from themselves (as far as boys were concerned) the reproach of committing boys to prison, then turning them out, without enabling them, if they pleased, to live honestly; 3rdly, that they had reduced the degree of evil necessary to confer the title of regular thief as low as they now could well hope, there being now no such thing as a gang, or connexion, between the dishonest boys, but all that they have had lately being merely boys yielding to a sudden temptation, not pre-meditatedly planning a theft.

The paper was received with much applause; and, at its close, a discussion took place on one or two points, and especially as to the policy of imprisoning boys before sending them to reformatory establishments. The Rev. Mr. JAMES, an Unitarian minister of Bristol, strongly advocated non-imprisonment; but Mr. BAKER was for a short imprisonment—say a week or fortnight—according to the present law. A letter had been received from M. de Metz, who said that he considered previous imprisonment of boys a most desirable thing.

'On the Position of Reformatory Schools in reference to the State, and the General Principles of their Management, especially as regards Female Reformatories,' by Miss CARPENTER.

'On the Mortality among Officers of the British Army in the East,' by Mr. R. T. JOPLING.
'Statistics of the Albanians,' by Dr. LATHAM.
'On the last Census of the Laps of Norway,' by M. L. K. DAA, of Christiania.

FRIDAY.

SECTION G.—MECHANICAL SCIENCE.

'A Report on the Measurements of Ships for Tonnage,' by Mr. A. HENDERSON.
'On the Inundation of Rivers,' by Mr. H. HENNESSY.

'On the Friction and Resistance of Screw Propellers when driven at high rates of velocity, and when immersed at different depths below the surface of the water,' by Mr. G. RENNIE.

SATURDAY.

'On a New Railway Break, invented by M. Sisoo, of Paris,' by Dr. GREENE.
'Report on the Measurement of Water, by Weir Boards,' by Mr. J. THOMSON.

'On the Development of Heat by the Agitation of Fluids,' by Mr. G. RENNIE.

MONDAY.

'On the Manufacture of Iron and Steel without Fuel,' by Mr. W. BESSAMER.—Mr. Bessamer asserted that crude iron contains about 10 per cent. of carbon; that carbon cannot exist at white heat in the presence of oxygen, without uniting therewith and producing combustion, that such combustion would proceed with a rapidity dependent on the amount of surface of carbon exposed; lastly, that the temperature which the metal would acquire would be also dependent on the rapidity with which the oxygen and carbon were made to combine, and consequently that it was only necessary to bring the oxygen and carbon together in such a manner that a vast surface should be exposed to their mutual action in order to produce a temperature hitherto unattainable in our largest furnaces. With a view of testing practically this theory, he had constructed a cylindrical vessel of three feet in height, somewhat like an ordinary cupola furnace, the interior of which was lined with fire-bricks; and at about two inches from the bottom of it inserted five tuyere pipes, the nozzles of which were framed of well-burnt fire-clay, the orifice of each tuyere pipe being about three-eighths of an inch in diameter. These were so put into the brick lining (from the outer side) as to admit of their removal and renewal in a few minutes when they were worn out. At one side of the vessel, about half way up from the bottom, there was a hole made for running in the crude metal, and on the opposite side there was a tap-hole stopped with loam, by means of which the iron was run out at the end of the process. The vessel should be placed so near to the discharge-hole of the blast furnace as to allow the iron to flow along a gutter into it. A small blast cylinder would be required, capable of compressing air to about 8 lb. or 10 lb. to the square inch. A communication having been made between it and the tuyeres before named, the converting vessel would be in a condition to commence work. It would, however, on the occasion of its being first used after re-lining with fire-bricks, be necessary to make a fire in the interior with a few baskets of coke, so as to dry the brickwork and heat up the vessel for the first operation, after which the fire would have to be all carefully raked out at the tapping-hole, which would again be made good with loam. The vessel would then be in readiness to commence work, and might be so continued without any use of fuel, until the brick lining in the course of time became worn away and a new lining was required. The tuyeres are situated nearly close to the bottom of the vessel; the fluid metal will therefore rise some eighteen inches or two feet above them. It is necessary, in order to prevent the metal from entering the tuyere-holes, to turn on the blast before allowing the fluid crude iron to run into the vessel from the blast furnace. This having been done, and the fluid iron run in, a rapid boiling up of the metal will be heard going on within the vessel, the metal being tossed violently about, and dashed from side to side, shaking the vessel by the force with which it moves from the throat of the converting vessel. Flame will then immediately issue, accompanied by a

few bright sparks. This state of things will continue for about 15 or 20 minutes, during which time the oxygen in the atmospheric air combines with the carbon contained in the iron, producing carbonic acid gas, and at the same time evolving a powerful heat. Now, as this heat is generated in the interior of, and is diffused in innumerable fiery bubbles through, the whole fluid mass, the metal absorbs the greater part of it, and its temperature becomes immensely increased; and by the expiration of the 15 or 20 minutes before named, that part of the carbon which appears mechanically mixed and diffused through the crude iron has been entirely consumed. The temperature, however, is so high that the chemically-combined carbon now begins to separate from the metal, as is at once indicated by an immense increase in the volume of flame rushing out of the throat of the vessel. The metal in the vessel now rises several inches above its natural level, and a light frothy slag makes its appearance, and is thrown out in large foam-like masses. This violent eruption of cinder generally lasts five or six minutes, when all further appearance of it ceases—a steady and powerful flame replacing the shower of sparks and cinder which always accompanies the boil. The rapid union of carbon and oxygen which thus takes place adds still further to the temperature of the metal, while the diminished quantity of carbon present allows a part of the oxygen to combine with the iron, which undergoes combustion, and is converted into an oxide. At the excessive temperature that the metal has now acquired, the oxide, as soon as formed, undergoes fusion, and forms a powerful solvent of those earthy bases that are associated with the iron. The violent ebullition which is going on mixes most intimately with scoriae and metal, every part of which is thus brought into contact with the fluid, which will thus wash and cleanse the metal most thoroughly from the silica and other earthy bases which are combined with the crude iron, while the sulphur and other volatile matters which cling so tenaciously to iron at ordinary temperatures are drawn off, the sulphur combining with the oxygen, and forming sulphurous acid gas. The loss in weight of crude iron during its conversion into an ingot of malleable iron, was found, on a mean of four experiments, to be 12½ per cent., to which will have to be added the loss of metal in the finishing rolls. This will make the entire loss probably not less than 18 per cent., instead of about 28 per cent., which is the loss on the present system. A large portion of this metal is, however, recoverable, by treating with carbonaceous gases the rich oxides thrown out of the furnace during the boil. These slags are found to contain innumerable small grains of metallic iron, which are mechanically held in suspension in the slags, and may be easily recovered, by opening the tap-hole of the converting vessel, and allowing the fluid malleable iron to flow into the iron ingot moulds placed there to receive it. The masses of iron thus formed will be perfectly free from any admixture of cinder, oxide, or other extraneous matters, and will be far more pure and in a sounder state of manufacture than a pile formed of ordinary puddle bars. And thus it will be seen that by a single process, requiring no manipulation or particular skill, and with only one workman, from three to five tons of crude iron passes into the condition of several piles of malleable iron in from thirty to thirty-five minutes, with the expenditure of about one-third part the blast now used in fiery furnace with an equal charge of iron, and with the consumption of no other fuel than is contained in the crude iron. To persons conversant with the manufacture of iron (said Mr. Bessamer), it will at once appear that the ingots of malleable metal which I have described will have no hard or steely parts, such as are found in puddled iron, requiring a great amount of rolling to blend them with the general mass; nor will such ingots require an excess of rolling to expel cinder from the interior of the mass, since none can exist in the ingot, which is pure and perfectly homogeneous throughout, and hence requires only as much rolling as is necessary for the development of fibre; it therefore follows that, instead of forming a merchant bar or rail by the union of a number of separate pieces

welded together, it will be far more simple and less expensive to make several bars or rails from a single ingot. Doubtless this would have been done long ago had not the whole process been limited by the size of the ball which the puddler could make. I wish to call the attention of the Meeting to some of the peculiarities which distinguish cast steel from all other forms of iron—namely, the perfect homogeneous character of the metal, the entire absence of sand-cracks or flaws, and its greater cohesive force and elasticity, as compared with the blister steel from which it is made—qualities which it derives solely from its fusion and formation into ingots, all of which properties malleable iron acquires in a like manner by its fusion and formation into ingots in the new process; nor must it be forgotten that no amount of rolling will give to blister steel (although formed of rolled bars) the same homogeneous character that cast steel acquires by a mere extension of the ingot to some ten or twelve times its original length. One of the most important facts connected with the new system of manufacturing malleable iron is, that all the iron so produced will be of that quality known as charcoal iron; not that any charcoal is used in its manufacture, but because the whole of the processes following the smelting of it are conducted entirely without contact with, or the use of any mineral fuel; the iron resulting therefrom will in consequence be perfectly free from those injurious properties which that description of fuel never fails to impart to iron that is brought under its influence. At the same time this system of manufacturing malleable iron offers extraordinary facility for making large shafts, cranks, and other heavy masses. It will be obvious that any weight of metal that can be founded in ordinary cast iron by the means at present at our disposal may also be founded in molten malleable iron, to be wrought into the forms and shapes required, provided that we increase the size and power of our machinery to the extent necessary to deal with such large masses of metal. A few minutes' reflection will show the great anomaly presented by the scale on which the consecutive processes of iron making are at present carried on. The little furnaces originally used for smelting ore have been from time to time increased in size until they have assumed colossal proportions, and are made to operate on two or three hundred tons of materials at a time, giving out ten tons of fluid metal at a single run. The manufacturer has thus gone on increasing the size of his smelting furnaces, and adapting to their use the blast apparatus of the requisite proportions, and has by this means lessened the cost of production in every way. His large furnaces require a great deal less labour to produce a given weight of iron than would have been required to produce it with a dozen furnaces; and in like manner he diminishes his cost of fuel blast and repairs, while he insures a uniformity in the result that never could have been arrived at by the use of a multiplicity of small furnaces. While the manufacturer has shown himself fully alive to these advantages, he has still been under the necessity of leaving the succeeding operations to be carried out on a scale wholly at variance with the principles he has found so advantageous in the smelting department. It is true that hitherto no better method was known than the puddling process, in which from 400 lb. to 500 lb. weight of iron is all that can be operated upon at a time; and even this small quantity is divided into homoeopathic doses of some 70 lb. or 80 lb., each of which is moulded and fashioned by human labour, and carefully watched and tended in the furnace, and removed therefrom one at a time, to be carefully manipulated and squeezed into form. When we consider the vast extent of the manufacture, and the gigantic scale on which the early stages of the process is conducted, it is astonishing that no effort should have been made to raise the after-processes somewhat nearer to a level commensurate with the preceding ones, and thus rescue the trade from the trammels which have so long surrounded it. Before concluding these remarks, I beg to call your attention to an important fact connected with the new process, which affords peculiar facilities for the manufacture

of cast steel. Doubtless this would have been done long ago had not the whole process been limited by the size of the ball which the puddler could make. I wish to call the attention of the Meeting to some of the peculiarities which distinguish cast steel from all other forms of iron—namely, the perfect homogeneous character of the metal, the entire absence of sand-cracks or flaws, and its greater cohesive force and elasticity, as compared with the blister steel from which it is made—qualities which it derives solely from its fusion and formation into ingots, all of which properties malleable iron acquires in a like manner by its fusion and formation into ingots in the new process; nor must it be forgotten that no amount of rolling will give to blister steel (although formed of rolled bars) the same homogeneous character that cast steel acquires by a mere extension of the ingot to some ten or twelve times its original length. One of the most important facts connected with the new system of manufacturing malleable iron is, that all the iron so produced will be of that quality known as charcoal iron; not that any charcoal is used in its manufacture, but because the whole of the processes following the smelting of it are conducted entirely without contact with, or the use of any mineral fuel; the iron resulting therefrom will in consequence be perfectly free from those injurious properties which that description of fuel never fails to impart to iron that is brought under its influence. At the same time this system of manufacturing malleable iron offers extraordinary facility for making large shafts, cranks, and other heavy masses. It will be obvious that any weight of metal that can be founded in ordinary cast iron by the means at present at our disposal may also be founded in molten malleable iron, to be wrought into the forms and shapes required, provided that we increase the size and power of our machinery to the extent necessary to deal with such large masses of metal. A few minutes' reflection will show the great anomaly presented by the scale on which the consecutive processes of iron making are at present carried on. The little furnaces originally used for smelting ore have been from time to time increased in size until they have assumed colossal proportions, and are made to operate on two or three hundred tons of materials at a time, giving out ten tons of fluid metal at a single run. The manufacturer has thus gone on increasing the size of his smelting furnaces, and adapting to their use the blast apparatus of the requisite proportions, and has by this means lessened the cost of production in every way. His large furnaces require a great deal less labour to produce a given weight of iron than would have been required to produce it with a dozen furnaces; and in like manner he diminishes his cost of fuel blast and repairs, while he insures a uniformity in the result that never could have been arrived at by the use of a multiplicity of small furnaces. While the manufacturer has shown himself fully alive to these advantages, he has still been under the necessity of leaving the succeeding operations to be carried out on a scale wholly at variance with the principles he has found so advantageous in the smelting department. It is true that hitherto no better method was known than the puddling process, in which from 400 lb. to 500 lb. weight of iron is all that can be operated upon at a time; and even this small quantity is divided into homoeopathic doses of some 70 lb. or 80 lb., each of which is moulded and fashioned by human labour, and carefully watched and tended in the furnace, and removed therefrom one at a time, to be carefully manipulated and squeezed into form. When we consider the vast extent of the manufacture, and the gigantic scale on which the early stages of the process is conducted, it is astonishing that no effort should have been made to raise the after-processes somewhat nearer to a level commensurate with the preceding ones, and thus rescue the trade from the trammels which have so long surrounded it. Before concluding these remarks, I beg to call your attention to an important fact connected with the new process, which affords peculiar facilities for the manufacture

of cast steel. At that stage of the process immediately following the boil, the whole of the crude iron has passed into the condition of cast steel of ordinary quality. By the continuation of the process the steel so produced gradually loses its small remaining portion of carbon, and passes successively from hard to soft steel, and from soft steel to steely iron, and eventually to very soft iron; hence, at a certain period of the process any quality of metal may be obtained. There is one in particular, which, by way of distinction, I call semi-steel, being in hardness about midway between ordinary cast steel and soft malleable iron. This metal possesses the advantage of much greater tensile strength than soft iron. It is also more elastic, and does not readily take a permanent set, while it is much harder and is not worn or indented so easily as soft iron. At the same time it is not so brittle or hard to work as ordinary cast steel. These qualities render it eminently well adapted to purposes where lightness and strength are specially required, or where there is much wear, as in the case of railway cars, which from their softness of texture soon become destroyed. The cost of semi-steel will be a fraction less than iron, because the loss of metal that takes place by oxidation in the converting vessel is about two and a-half per cent. less than it is with iron; but as it is a little more difficult to roll, its cost per ton may be fairly considered to be the same as iron. But as its tensile strength is some thirty or forty per cent. greater than bar iron, it follows that for most purposes a much less weight of metal may be used; so that taken in that way the semi-steel will form a much cheaper metal than any that we are at present acquainted with. The facts which I have brought before the Meeting are not mere laboratory experiments, but the result of working on a scale nearly twice as great as is pursued in our largest ironworks—the experimental apparatus doing 7 cwt. in thirty minutes, while the ordinary puddling furnace makes only 4½ cwt. in two hours, which is made into six separate balls, while the ingots or bloomers are smooth, even prisms, ten inches square by thirty inches in length, weighing about equal to ten ordinary puddle balls.

Explorations through the Valley of the Atrato to the Pacific in search of a Route for a Ship-canal, by Mr. F. M. KELLEY, of New York.—Several surveying expeditions have been sent by Mr. Kelley into this region, and much valuable information has resulted. But the chief result is a conviction of the feasibility of a ship-canal through the isthmus. The most recent of Mr. Kelley's explorers, Mr. Kennish, proposes to enter the Atrato by the Caño Coquito. The greatest depth on the bar is about 4 ft. at low water; the soundings gradually deepen, and become 30 ft. within 2 miles, when the depth increases to 47 ft., and is nowhere less up to the Truando. The width varies from a quarter of a mile to 2 miles, and the removal of the bar would allow of the transit of the largest steamers. The confluence of the Truando is about 63 miles from the Gulf, and that river forms the channel of the proposed line for 36 miles. The line then follows the valley of the Nerqua through rock-cutting, and passes the summit by a tunnel of 3½ miles. It reaches the Pacific through the valley of a small stream, and debouches at Kelley's Inlet. In the valley of the Atrato, 300 miles long and 75 broad, and lying between the Andes on the west, rain falls almost daily; which accounts for the immense supply of water in that region. On the Pacific side of the Cordillera there is scarcely any rain for eight months of the year. The greater portion of the rain falling in the Atrato valley is caught above the confluence of the Truando. Fifteen large tributaries and numerous smaller streams fall into the Atrato and contribute to the immense lagoons, which form natural reservoirs and a superabundant store of water throughout the year. There are various cogent reasons for selecting the confluence of the Truando as the best point from whence the passage from the Atrato to the Pacific may be effected. In the first place there is no point of junction with the Atrato by western tributaries near the level of high water on the Pacific as

that of the Truando. It happens to be 9 ft. above the Pacific at high water, and it is therefore of sufficient elevation to prevent the Pacific at high water from flowing through the proposed cut into the Atrato; while it is not so high as to cause the current from the Atrato to the Pacific at low water to pass through the cut too rapidly. In fact, the elevation of the Truando confluence just preserves a preponderating balance on the side of the Atrato. The Atrato, at the junction of the Salqui, is only 1 ft. above the level of the Pacific at high water; but the dividing ridge is 1,063 ft. high and 30 miles wide, according to a survey of that route by Mr. Kennish and Mr. Nelson. Should any of the rivers at the mouth of the Atrato be selected, without reference to the height and width of the dividing ridge, it may be observed that the maximum tidal wave in the Pacific being 25 ft. and that on the Atlantic only 2 ft., the Pacific at high tide would flow into the Atlantic with a current equal to a head of 11½ ft.; and at low water in the Pacific the Atlantic would flow into it with a similar current. In the inlet of the Gulf of Miecle, recently called Darien Harbour, the action of the tide is so strong that H.B.M. steamship Virago, commanded by Capt. Prevost, dragged both anchors ahead, and was only brought up by paying out nearly all her cable. The heights of the tides and the levels of the two oceans have been well established by the recent observations of Col. Tolten in Navy Bay on the Atlantic and in a deep bend of the Bay of Panama on the Pacific. On the Atlantic a consecutive series of thirty-two observations were taken in the months of August and September during the season of calms. On the Pacific two sets of observations were made. The first, during May and June, when fifty-four consecutive tides were observed in a season of calms; and the second in November and December, when fifty-two consecutive tides were observed in a season of light winds. The results do not exactly correspond, and are given in the following table:—

	Pacific.		Atlantic.
	May and June	Nov. and Dec.	Aug. and Sept.
Greatest rise of tide	1772	2130	160
Least	794	970	063
Average	1208	1410	116
Mean tide of Pacific above	0759	0140	
Mean tide of Atlantic			
High spring tide of Pacific above high spring tide of Atlantic	940	1012	
Low spring tide of Pacific below low spring tide of Atlantic	633	940	
Mean high tide of Pacific above mean high tide of Atlantic	625	673	
Mean low tide of Pacific below mean low tide of Atlantic	473	526	
Average rise of spring tides	1408	1730	
Average rise of neap tides	960	1249	

These observations make the mean level of the Pacific from 0·14 to 0·75 higher than the mean level of the Atlantic; but this is probably owing only to local circumstances, and it may be assumed that there is no difference in the mean levels of the two oceans. The conclusions arrived at by the successive independent surveys carried out at the expense of Mr. Kelley may be summed up as follows:—First, That the oceans can be united through the Atrato and Truando by a canal without a lock or any other impediment. Second, That while the distance between the oceans by this route is only 131 miles, half that distance is provided by nature with a passage for the largest ships. Third, The remaining distance requires the removal of bars, excavations, and cuttings, presenting no unusual difficulties. Fourth, Harbours requiring but little improvement to render them excellent exist at the termini.

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RURAL CHEMISTRY

AN ELEMENTARY INTRODUCTION TO THE STUDY OF THE SCIENCE IN ITS RELATION TO AGRICULTURE.

BY EDWARD SULLY, F.R.S., F.L.S., F.G.S.

Honorary Member of the Royal Agricultural Society of England, Professor of Chemistry to the Horticultural Society of London, Lecturer on Chemistry in the Honourable East India Company's Military Seminary at Addiscombe, &c. &c.

PREFACE TO THE THIRD EDITION.—In accordance with numerous suggestions, very considerable additions have been made to this little book in preparing it for a new edition; several important practical matters, not treated of in any former editions, having been introduced. Brief descriptions of the more important of the domestic arts, such as Wine and Vinegar Making, Brewing, the Manufacture of Spirits, Baking, Cheese-making, Cookery, &c., have been added, together with some account of the Scientific Principles involved in those arts. Numerous recent analyses of agricultural crops have likewise been given, and the whole has been carefully revised and corrected."

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Alkalies—vegetable	Calomel	Cyanine	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, decomposition	Vinegar
Almonds	Camphor	Cream cheese	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, soft	Vinegar, distilled
Alum	Candle, burning of	Cream cheese	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, transparent	Vinegar, vegetable
Alumina	Cane	Cream cheese	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, yellow	Vinegar, vegetable
Alumina absorbs ammonia	Cane sugar	Decay, influence of	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, ash	Vinegar, vegetable
Alumina, in soil, use of	Caramel	Decay, influence of	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, animal	Vinegar, vegetable
Alumina, phosphate of	Carbon in plants	Decay, influence of	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, decomposition	Vinegar, vegetable
Alumina, sulphate of	Carbonate of ammonia	Decay, results of	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, soft	Vinegar, vegetable
Alumina, sulphate of iron	Carbonate of iron	Decomposition	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, transparent	Vinegar, vegetable
Aluminum, oxide of	Carbonate of lime	Decomposition, induced	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, yellow	Vinegar, vegetable
Ammonia absorbed by alumina	Carbonate of lime	Decomposition, of	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, ash	Vinegar, vegetable
Ammonia absorbed by charcoal	Carbonate of lime	Decomposition, spon-	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, animal	Vinegar, vegetable
Ammonia absorbed by charcoal, &c.	Carbonate of lime	Decomposition, spon-	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, decomposition	Vinegar, vegetable
Ammonia, carbonate of	Carbonic acid decom-	Decolorisation	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, soft	Vinegar, vegetable
Ammonia, fixing of	Carbonic acid decom-	Dextrine	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, transparent	Vinegar, vegetable
Ammonia in rain water	Carbonic acid decom-	Dextrine	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, yellow	Vinegar, vegetable
Ammonia, loss of	Carbonic acid decom-	Dextrine	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, ash	Vinegar, vegetable
Ammonia, muriate of	Carbonic acid decom-	Dextrine	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, animal	Vinegar, vegetable
Ammonium, phosphate of	Carburetted hydrogen	Dextrine, derang-	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, decomposition	Vinegar, vegetable
Ammonium, sulphate of	Carburetted hydrogen	Dextrine, derang-	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, soft	Vinegar, vegetable
Ammonium, sulphate of	Carburetted hydrogen	Dextrine, derang-	Gastric, strength of	Nitrogen	Naphtha	Potash	Principles, transparent	Vinegar, vegetable
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